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NATIONAL INFRASTRUCTURE ISSUES

HEARINGS

BEFORE THE

SUBCOMMITTEE ON WATER RESOURCES,
TRANSPORTATION, AND INFRASTRUCTURE

OF THE

COMMITTEE ON
ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

ONE HUNDREDTH CONGRESS

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NATIONAL INFRASTRUCTURE ISSUES

TUESDAY, OCTOBER 6, 1987

U.S. Senate,
Committee on Environment and Public Works,
Subcommittee on Water Resources, Transportation,
and Infrastructure,
Washington, DC.

The subcommittee met, pursuant to notice, at 10:03 a.m., in room SD-406, Dirksen Senate Office Building, Hon. Daniel Patrick Moynihan (chairman of the subcommittee) presiding.

Present: Senators Moynihan, Burdick, Graham, Symms, Durenberger, and Pressler.

OPENING STATEMENT OF HON. DANIEL PATRICK MOYNIHAN, U.S. SENATOR FROM THE STATE OF NEW YORK

Senator **Moynihan**. A very pleasant good morning to our guests, witnesses, and members of the press.

This is the second in the series of hearings on infrastructure, which the Subcommittee on Water Resources, Transportation, and Infrastructure will hold in this First Session of the 100th Congress.

As some of you will know, we began, just before the summer recess, with a memorable event, the first of our series in which the Speaker of the House of Representatives, Mr. Jim Wright, appeared. That was one of the rare occasions in our history when the Speaker of the House has come to the Senate. Almost always, previously, these have been occasions when a Member of the House was being nominated for a Federal judgeship, and the Speaker came along to introduce him, as it were. I do believe it was the first time in history that a Speaker came to address a subcommittee of our body.

Good morning, Mr. Chairman.

Senator **Burdick**. Good morning.

Senator **Moynihan**. The Speaker was accompanied by our very good friend, the distinguished chairman of the Committee on Public Works, Mr. Jim Howard, and the committee's ranking Republican, Mr. John Paul Hammerschmidt.

We have a very simple agenda, although it is a very large one, in these hearings, which is to say that a number of the great public works enterprises, which the United States launched in the postwar era, if we can still use that term, are now coming to an end.

It is not too often restated that the first two acts passed by the 100th Congress, the Clean Water Act and the Surface Transportation Act, both bring those programs to a close. The Clean Water Act has 4 years remaining, and then devolves into a revolving loan fund. The Surface Transportation Act, basically, brings an end to the Interstate and Defense Highway Program, which began in 1956. After 35 years the program is finished, the roads are built. There will be a few remaining sections here and there under litigation, but basically the interstate system is built.

We were able in the last Congress to get the first water resource development bill in 17 years, but we have to see that we can find funds to resume a program in water resource development that ended in 1970.

All of this comes in the context of an awareness that there are large issues of economic infrastructure, which have yet to be addressed, which have not been conceptualized, have not been put into anything like a program, and have not been quantified. Certainly no thought has been given as to how they might be funded.

This committee was thinking about this matter in the last decade and early in this one, and we established the National Council on Public Works Improvement. We are going to hear from that group this morning, as from other interested officials and individuals from the country. We are very happy to get on with this work. We have lots to do, and we have only scarcely begun.

It is a great honor for this subcommittee to have its distinguished chairman present on this occasion. I wonder if you wish to say a word or two.

OPENING STATEMENT OF HON. QUENTIN N. BURDICK, U.S. SENATOR FROM THE STATE OF NORTH DAKOTA

Senator **Burdick**. You have pretty well covered it. I have a statement that, in the interest of time, I will submit for the record.

Senator **Moynihan**. So ordered.

[Senator Burdick's statement follows:]

Opening Statement of Hon. Quentin N. Burdick, U.S. Senator From the State of North Dakota

Good morning. I extend a cordial welcome to the very talented group of experts that we have gathered here today. The witness list displays an impressive array of knowledge and experience regarding infrastructure.

In March of this year, while the agenda for the 100th Congress, and for this committee in particular, was being put in its final form, I stated that what is most necessary for infrastructure is that we begin the process of consensus building. The hearing we are holding today is the second in a series of hearings that are an attempt to develop that consensus.

The topics which the Subcommittee Chairman, Senator Moynihan, and Ranking Member, Senator Symms, identified in their letter of invitation to the witnesses are major items on which consensus is needed. For the benefit of our audience, those topics are 1) financing, 2) research and development, 3) maintenance, 4) cost sharing, and 5) competitiveness.

There is general agreement that there are infrastructure needs. What is lacking is a commonly accepted agenda with which to tackle those needs. Agreement on the topics to be discussed in this hearing would go a long way toward producing that agenda. We will not reach that goal today, but we hope to further the process of consensus building.

The toughest issue which we face is the matter of financing. I know it is clear to all of you that the budget problems and the deficit are not going to go away for a while. Given that situation, should we have a federal infrastructure program? I stated at the first infrastructure hearing on July 22 that we need a federal, state and local partnership. And I stand by my statement. But I am only one person expressing my opinion. Many more people will have to come to the same conclusion before action can be taken.

If federal involvement is proposed for an infrastructure program, we must decide how to pay for it. We must learn whether there is a willingness to reduce funding for other programs already in the federal budget in order to make room for a federal infrastructure program.

In the alternative, we must determine whetner there is a willingness on the part of the public to adopt user oriented taxes. A user oriented tax built on the model of the highway trust fund would have the benefit of taxing only in proportion to the amount of use and the protection of only being spent for the benefit of those paying the tax. Nevertheless, it is still a new and an additional tax. Do we want that?

I believe that there is a general consensus regarding another item on our discussion list, which is cost sharing. If we do have a federal program, cost sharing will most likely be required. We have had many years of experience with it in the Federal-aid highway program.

During the 99th Congress this committee reported out and carried forward the Water Resources Development Act of 1986. That bill established local cost sharing ranging from ten to fifty percent depending on the scope and size of the project. I am convinced that cost sharing is here to stay. Now we need to decide how to apply it in the context of infrastructure programs.

In my opening statement at the first of this series of infrastructure hearings this past July 22, I stated that one of the more pressing needs of rural and small communities is their water supply system. I note that the National Council on Public Works Improvement report on Water Supply concludes that "A national problem does exist for small water systems." Among the causes cited by the Council for this problem is the lack of access to capital. This is an area I will be examining more closely during the remainder of this Congress.

For now, I am anxious to hear what our witnesses have to say on these matters. Thank you very much, Mr. Chairman.

Senator MOYNIHAN. Why don't we proceed. Our first witness will be Mr. John Horsley, who is the commissioner of Kitsap County, Washington, and the chair of the Rebuild America Coalition.

Mr. Horsley, you are more than welcome as you represent an extraordinary coalition. It is indeed the American Consulting Engineers Council, the American Institute of Architects, the American Public Works Association, the National Conference of State Legislatures, the National Governors Association, the National League of Cities, and the U.S. Conference of Mayors, as well as the National Association of Homebuilders, the Associated General Contractors of America, and your own particular association, the National Association of Counties.

It is a great weight for a young man to carry, but we welcome you and we look forward to your testimony.

STATEMENT OF JOHN HORSLEY, CHAIR, REBUILD AMERICA COALITION

Mr. HORSLEY. Thank you, Mr. Chairman, and Senator Burdick. It is a pleasure to be here on behalf of the Coalition that we have pulled together behind what we consider not only a neglected issue, but an issue that we think needs to move to the forefront of the national agenda.

In the views of the Governors, the mayors, the county officials, our public works staffs, and the citizens we represent, and the array of private sector organizations that have joined together with us, the Associated General Contractors, the Homebuilders, the designers, the architects, the engineers, and the financers, we see that as appropriate as Congress' concern is for the deficit, it has diverted attention and action from an area of economic endeavor that is probably as vital to the growth and prosperity of this country as anything else that Congress will address itself to. That is the capital investment in the public facilities the nation's economy depends on.

As you and other members of this important committee have witnessed since 1982 when this came to the fore as the national crisis, instead of doing more, we have done less. Federal funds in this area have been cut approximately $10 billion, and as a result of the Tax Reform Act that went into effect just this year, what we have been able to invest from the State and local level has declined by something in the range of $24 billion just in one year alone.

Senator MOYNIHAN. Will you help us here? You have these as quantified numbers. When you say that Federal outlays have declined by $10 billion, do you mean $10 billion per year, and $10 billion as against what you have defined as the universe of outlays?

Mr. HORSLEY. The figures I am citing come out of the report, "Defining the Issues," which was done by the National Council on Public Works Improvement a year ago.

Senator MOYNIHAN. That is their preliminary report?

Mr. HORSLEY. That is right. Also as a part of the proceedings that Senator Domenici sponsored, the Private Sector Advisory Panel on Infrastructure Financing, on which Dana Huestis from the Associated General Contractors and I participated. Their records document some of the cutbacks since 1981 that have taken place in these various programs.

Senator MOYNIHAN. Your testimony today is that the public investment in infrastructure has dropped from 3.5 percent of GNP in 1967 to 2.7 percent of GNP in the mid-1980's. Where are those numbers from?

Mr. HORSLEY. Again, the Defining the Issues Report is where I saw that chart the first time. There is probably an original source, which I could dig out for you. But they cite that statistic. This was up until 1984, as I recall, and since then there have been several cutbacks in other programs.

The one program that has sustained funding is the Highway Program. We did increase the gas tax a nickel and for that reason we have been able to sustain spending on highways. But virtually every other area of Federal endeavor has had to be cut.

Senator MOYNIHAN. The Highway Program will now conclude. It will be finished.

Mr. HORSLEY. Unless action is taken.

Senator MOYNIHAN. No. I think that we don't want to keep pouring concrete until everything is paved. When the roads have been built, what do you need to do next? We don't measure our effectiveness just by the amount of money we spend, but what we do with it, and what we need to do it for, that is the issue.

Mr. HORSLEY. Absolutely.

Senator MOYNIHAN. There is a tendency to say that we need public works because that keeps contractors contracting. No. We need public works because we need public works, that is the case to be established. But continue.

Mr. HORSLEY. Absolutely. The other statistics that I just cited, and I would like to pass up to the two chairmen, are referenced out of the September 1 issue of the Bond Buyer, which indicates the devastating effect that the Tax Reform Act of 1986 has had on municipal bonding. What that indicates is a cutback in what we have been able to finance through municipal bonding from 1986 to 1987, a drop of $24 billion in infrastructure type projects at the municipal and State level.

Mr. Chairman, the problem is fairly well outlined, and as both of you understand so well from talking to your own constituents. I have been in your office, Mr. Chairman, with Carl Young, County Executive of Broome County, N.Y. Carl tells me, because of the necessity to increase spending on Medicaid, not only has he had to double his local property taxes in Broome County, but he has had to cutback on his funding of roads.

In North Dakota, and throughout the Midwest, what we are seeing is a deterioration and decline of rural bridges, and farm-to-market roads. Railroad abandonment has shifted more and more burdens onto local county roads, and the counties out there in that neck of the woods simply cannot keep pace with the need.

We have a compounding problem where we are cutting back at the Federal level, we are constraining the use of municipal bonding at the State and local levels to solve this problem, and the shift of social spending responsibilities from the Federal level down to us at the local and State level, in many places, has forced us to curtail spending on infrastructure. The net effect, since 1982, has been that America is investing still less than we were when this problem came to the fore.

The reason that the governors, the mayors, the county officials, the contractors, the homebuilders, the designers, and the financers have come together is to again help you in the Congress propel this to the forefront of the national agenda and say to the American people: Folks, we cannot continue neglecting this problem, we have to do something about it.

Now is the time to press forward for action. We at the local level and the State level want to join with the Federal Government in solving this problem. But I am firmly convinced that you are not going to see sufficient initiative taken unless it is at all three levels, and we see leadership and the partnership again extended from the Federal level to encourage innovation and new initiatives at the State and local level to solve this problem.

Senator MOYNIHAN. Mr. Horsley, there are two things that I might say. First, go through for the committee, if you will, the question of the effect of the Tax Reform Act of 1986 on local financing, on the issuance of bonds for purposes of public works?

Mr. HORSLEY. Mr. Chairman, there are several effects that the Tax Reform Act of 1986 has had, and let me go through those briefly. It reduced many public and private incentives for infrastructure investment, hindering the most efficient means of funding infrastructure, public/private partnerships. It has taken away the incentives through accelerated depreciation and several other means that were in the previous code.

Bonds issued to finance many types of infrastructure projects are now classified as private activity bond, and the test has shifted from 25 percent being for private activity to 10 percent, and the definitions have changed.

Very stringent volume caps, as you are aware, have been placed on private activities at the State level, reducing the caps from 150 per capita down to 75 over time. The drop that you see reflected in that September 1 Bond Buyer was before these volume caps have had their impact. The cutback on municipal bonding may be even more severe a year from now.

Whether you look at the incentives to private partnerships that have been removed, the burdens that have been placed on us in terms of the elimination of arbitrage, or the other complications thrown into issuance, and the increased costs to our ratepayers that those have caused, or at the volume caps, the several blows that have been imposed through that act, have had the net effect of curtailing the use by municipalities of municipal bond financing.

Senator **Moynihan**. That is something that we have to get to at the level of a very specifically quantified provision, because we did that, in the Finance Committee, and we did it at the behest of the Treasury principally because they felt that there was just too much tax avoidance through the issuance of tax exempt bonds when, in fact, there were private activities involved.

There is no question, and I know that the chairman knows, that the level of municipal bond sales has just dropped very dramatically, and it has to be associated with the decline in activity, or it likely could be that this has gone to private financing, but I doubt it.

Mr. **Horsley**. The problem that we are trying to focus the attention of the Congress on, and we know that you two leaders are very well aware of it, but part of the mission of this coalition is public awareness and to bring some of these problems to the fore so that the rest of your colleagues are as sensitive as you are.

We have had Federal cutbacks that have more than offset the initiatives that, indeed, are being launched by Governors, and county and city officials all over this country to try to do our part. But what we are doing is being more than offset, on the one hand, by Federal cutbacks and then this double whammy of the Federal Tax Code has set us back further.

The bottom line is that any economy depends on both capital spending in the private sector, and adequate capital spending in the public sector, and because of numerous reasons, pressure is forcing out capital spending at the public level to the degree that it does, indeed, need to take place to keep the American economy growing and strong and competitive.

The fact is, our opposition or our competition out there in the rest of the world is not standing still, and if we don't keep up in our public sector investments, we are going to lose ground to the competition there just as is the case in the private sector.

Senator **Moynihan**. I think that we will have to hold a special hearing on the question of financing. By changing the rules, we may have made it more difficult to obtain financing. First we reduce Federal outlays, and then we inhibit local efforts, you have the making of policy.

It may not be intended policy, it may be even hidden policy, but it is an effective policy, if that is what one wanted to do.

Mr. **Horsley**. Yes.

Senator **Moynihan**. We are still having problems getting hold of two things. One is the conceptualization. "Infrastructure" is a very generalized word, not a word like "highways," not a word like "railroads," and not a word like "canals." It is not clear that you can define it in very specific terms. It doesn't say anything, yet maybe we can begin to illustrate it by reference.

For example, the subject of long distance transportation has not traditionally been a public factor, but consider that with the advent of superconductivity technology—science has known for a long while that that technology is roaring ahead—it is entirely feasible to think of a rail connection, let us say, between Boston, New York, and Washington, where trains would travel at 350 miles an hour.

There is not much more space. You can't find any more space above National Airport or LaGuardia Airport or Logan Airport. There is just a finite amount of space out there and a finite number of planes. We are just about at the level where we can't get any more in.

Our rail system, even though Amtrak has some things to say for itself, is still a 19th century machine, a 19th century arrangement. The only thing that has changed is the propulsion techniques, sometimes it is diesel and sometimes it is electricity. But nothing has changed in the basic technology.

In France, there is now a rail connection between Paris and Marseille. The train runs at 175 miles an hour effortlessly, and you get French meals in the course of the trip, and that is an old technology. The Japanese are now working at the level of field experiments with rail transport that goes at 370 miles an hour. It takes you a long time to slow down at 370 miles an hour, but still it is entirely doable. It is done.

The question is: Having been the first Nation to produce railroads, and we were certainly the first to produce scheduled airlines, are we going to be the last to evolve into a 21st century technology with respect to rail transportation?

The railroad is a pre-Civil War device, and the automobile is just vaguely a post-Civil War device. The first automobile developed was shown off in Vienna on the day that Grant took Richmond.

Mr. HORSLEY. Is that right?

Senator MOYNIHAN. Yes. It is an old machine. It is a very old machine. We are still fooling around with these old machines, and that is not what we think of ourselves.

Mr. HORSLEY. What is exciting to see happen in the private sector is the introduction of fiber optics. Throughout the bowels of urban America, all the old cables are being removed and being replaced with fiber optic cables to get into the information era.

Just as you are touching on, we have got to keep up to move our people. I think a lot of our commuters in urban areas would be satisfied simply to get to their office in under an hour.

Senator MOYNIHAN. Forty miles an hour would be fine.

Mr. HORSLEY. Forty miles an hour would be fine. As a matter of fact, it would be a break through. But we are even losing the battle there, whether it is in the decline of our mass transit systems that just are in place, or the 20-year lead time to go from one system to the next in terms of the planning.

Senator MOYNIHAN. No, sir, if I may say, it is not a 20-year lead time. It has become a 75-year lead time.

If I could say, your fiber optics is a very good example. The first paper on fiber optics was produced by a research scientist at Corning Glassware, in Corning, NY, in about 1972. Within a decade, we were refitting private communication systems with fiber optics all over the country.

On mass transit, the subway is simply a trolley car underground, and the design has changed, it has been improved, but it is a 19th century animal. Nowhere in this country do you have the technology and techniques or anything else that would be associated with, for example, superconductivity materials.

They are not even being discussed. We are thinking about how to make that trolley car work better. We have done about as much about as we are going to do in the way of technology, at least that is what I think.

We have had two distinguished members of the subcommittee join us.

Senator Durenberger, good morning, sir.

Senator DURENBERGER. Good morning, Mr. Chairman.

Mr. Horsley, it is nice to see you again.

If I may be permitted just a brief statement. John and I have worked together for several years now, I think even before he became chairman of NACO, and since he has been chairman. I compliment you, Mr. Chairman, if you made the decision, or either one of you two, to invite him to speak.

Senator MOYNIHAN. We had the Speaker of the House lead off the last time, and Mr. Horsley this time.

Senator DURENBERGER. This may be an improvement.

You see how strongly I feel about local government.

John, you have heard me speak on occasion, back when I chaired the Intergovernmental Relations Subcommittee, about the desperate need in this country to come to grips with the issue of national purposes and the fact that what the President has been fighting for 7 years is a theory that may not necessarily be true, and that is that that the National Government set out to gobble up local government by using an inflated income tax to buy everybody out of their line of business.

We are confused here because we now think we are responsible for everything only because we have a program or a regulation that affects everything. From my speech in Baltimore back in 1982, when the President called me out of a breakfast to give me a hard time, to this day, I have stoutly defended the notion that just because potholes are commonly experienced, filling them is a national purpose or a national responsibility, or just because, as you point out in your statement, there is billion dollars worth of bridge defects makes bridges a national responsibility.

So it strikes me that what your association and what this examination into infrastructure really is all about is the business of redefining national purposes. It doesn't mean that we don't have a role to play.

You are absolutely right in the statement about criticizing us in the 1986 tax bill for what we did to tax exempt bond financing in which we confused the notion of private ownership with private purpose.

It is amazing around this place how you can't get through people's thick skulls that you can have private enterprise conducting a public purpose just as many of these railroads, airlines, and so forth, are serving a public need, but they are privately owned, because there are certain advantages to the consumer in having them privately owned, which we are trying, I think, from time to time to learn.

I have just one question, that is all.

I served with our colleague Dan Evans, the former Governor of Washington, and with Chuck Robb, when he was then Governor of Virginia, on the Commission on National Purpose. Out of that, one of the recommendations, and obviously this is sort of a far-reaching suggestion, but since you are a County Commission, I thought that you might want to respond to it.

Of all of the swaps that we could contemplate here in discharging national responsibility, the biggest one might be for the National Government to undertake principal responsibility for the income security and income maintenance systems in this country. Not that we conduct the programs, and not that we make the decision on social services, health and welfare, and so forth, but that we guarantee that the fiscal disparities between communities or between states don't stand in the way of local government providing for the income maintenance part of the system.

In exchange for a national commitment to people, we would devolve much of the responsibility, if you will, for infrastructure to State and local governments. That was done 100 years ago, and even the Constitution has provided for a post road.

It is pretty clear that if you are an original intender in the Constitution, you believe there is a national responsibility to build highways. But if you are realistic, you look at the way we build highways in the public works side of this Environment and Public Works Committee, and you have to wonder whether the Founding Fathers could ever contemplate a nation that would come to exchanging potholes between Senators.

What is your general reaction to looking out ahead at 10 or 15 years, whatever it takes, to this kind of major intergovernmental exchange where the infrastructure moves to the State and local level, whereas the income security/income maintenance moves to the national level.

It doesn't mean that we shouldn't still look at that part of the Tax Code that bans public purpose in tax exempt bonds and so forth, it just means that the direct appropriation, the decisionmaking about where the highways go, where the waste water systems go are not going to made here, they are going to be made back in Kitsap County.

Mr. HORSLEY. Senator, I wish it were as easy as saying that potholes are local, and infrastructure should be shifted to the state and local level, and have you pick up income maintenance. The fact of the matter is, we are all in it together in terms of how we tax and how we serve the American people.

The shift of burden that has taken place over these last several years has, indeed, curtailed what is being spent at the Federal level, but it has also compounded our problems in providing services at the local level. Indeed, as I pointed out, in Broome County, New York, or in Kitsap County, Washington, it caused us, when we cut revenue sharing, it forced me to cut my road budget so I wouldn't have to cut my sheriffs budget. So I am spending less on infrastructure today because of actions taken at the Federal level.

What I would like to see the Congress address is a national policy that says: We need to keep America growing and strong, and free. We need to invest *x* amount, whether it is 3 or 4 percent of our GNP, in these important capital systems. Then, in concert with the states and localities, figure out how to bring us back up to that level, because we are approaching 2 percent.

We need to be spending about a third or half again as much on infrastructure as we have been, and in my view that is going to take Federal leadership to leverage courage and political feasibility at the State and local level. We have been raising taxes. We have been raising utility rates in order to build these systems, but we need a Federal partnership to enable us to do even more, because the nation needs it, not just because we need it at the local level.

Senator MOYNIHAN. I remarked earlier, Senator Durenberger, that the effects of the Tax Reform Act of 1986 are what they appear to be, we will have, in effect, put in a national policy that inhibits the development by State and local governments of the normal infrastructure needs. We have made it more difficult for them to do. If we did so, we might as well have intended to do so, because that is what we did. I think that we ought to have a specific hearing on that issue, and your issue.

The thing that Mr. Horsley said, and I don't know whether we will be able to do this, we ought to try to find some economic rationale that says that we ought to be spending 4 percent of GNP in this range of activities. This is sort of a benchmark investment for how you would make that decision, I don't know, but some level. But we need that kind of quantification because we are losing the nice specificity of canals, and railroads, and highways.

If I may say, apart from the poor old State of New York that had to do it on its own, the canals were built by the Federal Government, and the railroads were subsidized by the Federal Government, the across plains railroads, something like 20 percent of the land west of the Mississippi was given to railroad companies. The roads, the Interstate Highway System has been built by the Federal Government. But that specific enterprise is not quite on the horizon.

Senator Graham, would you want to say something on the subject?

Senator GRAHAM. I would like to pursue the inquiry that Senator Durenberger was suggesting. As we look to the role of the levels of government over the next 2 or 3 decades, it seems to me that there are some basic alternatives that have been suggested.

One is the sorting out of functions or alternatives in which the Federal Government would assume responsibility for the income maintenance programs, and the State and local for the more geographically based programs such as the transportation, and water/sewer.

The other approach which, in reading your statement, and I am sorry I arrived late, seems to suggest kind of a continuation with maybe a greater level of assurance of the status quo. Your first recommendation is that we can afford no further funding reductions in existing Federal programs that address infrastructure needs.

If you carried the logic of your position out, what would you see the Federal role as being, say, at the year 2000?

Mr. **Horsley**. Senator, it is my understanding that in the State of Florida, a study was recently done that surfaced $60 billion in infrastructure needs in a 5 to 10 year time frame, or 15 years.

Senator **Graham**. It is both an accumulation of needs and projections in the next 5 or 10 years. It is very substantial.

Mr. **Horsley**. It sounds like you moved up here at just about the right time.

The difficulty that you are facing in Florida, it is my understanding, is a very similar difficulty faced by southern California, Arizona, my county of Kitsap. Rapidly growing areas are having a struggle to keep up with their expansion. But at least in those booming areas, such as Florida and Kitsap County, we can bet on the come and our citizens are willing to tax themselves in the anticipation that they will get that investment back.

I think that many of those areas, with the correct array of Federal tax policy and enabling legislation, can sustain their own growth on their own. But the areas where I especially see, in the short term, the need for Federal assistance is in the heartland of this country, where the tax base is hurting and they can't do it on their own right now. In our view, the nation has a stake in helping those areas pick themselves up by their own bootstraps by giving them a hand up.

Even in the State of Florida, my friend, Harvey Ruven, who is now my successor as president of our national association, and a friend of yours, is having a tough time in Dade County keeping up with their growth. I think they need the assist of the continuation of Federal help in mass transit, and all of the other areas where the Federal government participates.

Our coalition has a five-point agenda, and the first is, no further cutbacks. One of the second ones, and we encourage your committee, Mr. Chairman, to take a hard look at this, is taking the two trust funds, the Highway Trust Fund and the Airport Trust, off budget so that they can be spent for the purpose, near-term, that the people are being taxed for.

The $5.7 billion is in the Airport Trust Fund reserve, and our airports nationally badly need expansions so we can keep people on time and moving safely. There are airports down in Florida that could use some of that investment near term.

Long-term, again, there are many national purposes to be served, but to me the most paramount is national leadership in partnership with Governors, like yourself, and county officials, like me, to make it appear to our taxpayer that we are all in it together, moving in a common direction, which is expanding the economic pie and our growth.

Senator **Moynihan**. May I ask, Mr. Horsley, that five-point program, do I see it in your statement?

Mr. **Horsley**. The last three pages, Mr. Chairman, briefly it is: One, no more cuts in Federal programs; two, revisit the Tax Reform Act of 1986 to repair the damage that you did to municipal bonding; three, restore the trust in the trust funds by taking in off budget and spending them for the purposes that they were intended for; four, as I outlined to you in a meeting in your office, we see the need for new initiatives such as that national reinvestment partnership leveraging, using minimal Federal outlay to leverage courage and political action at the state and local level to do more and invest more; then, finally, the necessity of getting the Federal Government on a capital budget so that you can separate out current expenditures for current consumption as opposed to long-term investment in the future of this country.

I didn't mean to interrupt, Senator Graham.

Senator **Graham**. I think that this issue represents a very basic juncture in federalism for the 21st century, and that is, are we going to take the position that federalism will be defined as the status quo with some modification extended, or is this a time to reexamine the fundamental relationships and attempt to arrive at some rational construct of what should be Federal, State, and local.

I start from a premise that I think it is desirable in government to have somebody accountable for results, and that the public is not well served when we have multiple levels of government involved in highway construction. When you have to deal with a local government, often in terms of siting the corridor of the highway, State with responsibility for planning and design, and a Federal government which is going to put up 70 to 90 percent of the money, the combination of all those interactions results, in my opinion, in going to the most expensive solution for every issue that is raised, delay in getting the project completed, and tremendous opportunities for finger-pointing if something doesn't go right, and almost inevitably there are some problems in these major projects.

I think we would be better served if we decide who is going to build what kind of transportation for this country and put that essentially at one level of government, who is going to be responsible for financing the cost of America's at risk population, and the other major responsibilities.

Mr. **Horsley**. Senator, in brief, let me put it in these terms. In the ideal world, I would agree with you totally that we should have more of a sorting out and clear assignment of accountability and responsibility.

Ten years ago, we had the Federal Government spending about 40 percent on infrastructure issues, and the State and local, government about 60 percent, but a great, massive amount being spent. Now it is a much smaller pie, with the State and local spending about 75 percent and the Federal Government, about 25 percent. The fact is that we are not spending enough.

Now, if we can establish this national policy and setting a goal that says: We, as a Nation, in the aggregate, need to spend more, and then together can reach a consensus on how we increase that commitment, I would much prefer it. It would be much more efficient, more streamlined, more effective, if those resources did, indeed, come from the State and local level, with less Federal interference. But in the real world, I think we are going to need Federal leadership to get us there. Leverage, I think, is a great part of that and use of the Tax Code can help us.

Senator **Moynihan**. The Tax Code is a public works policy. The idea of capital budgeting is, I think, an idea that has come, some notion of what rate of investment do you need, or what proportion of GNP needs to go for this purpose, and how you allocate it, and the Federal is another question.

Senator Pressler, do you have any questions?

OPENING STATEMENT OF HON. LARRY PRESSLER, U.S. SENATOR FROM THE STATE OF SOUTH DAKOTA

Senator **Pressler**. Mr. Chairman, I thank you very much. I have an opening statement that I will not burden you with, but I will ask unanimous consent to place it in the record.

Senator **Moynihan**. Without objection.

Senator **Pressler**. It talks about some of the rural problems that exist on Indian reservations. I speak of the water problems, the infrastructure of water problems, the ground water supplies in many areas do not even come close to safe drinking water standards. So it is not only an urban problem, as has been pointed out, but it is also it is also very much small cities, towns, and Indian Reservations that have a great problem with infrastructure.

I talk in my opening statement, about some of the water pipeline projects we have in rural water systems in South Dakota that serve both small towns as well as farmers. But our infrastructure is old and very much in need of repair.

I join and I commend you, Mr. Chairman, for scheduling this second hearing on the status of our Nation's infrastructure, because it is an issue critical to my State and to our country.

[Senator Pressler's statement follows:]

Opening Statement of Hon. Larry Pressler, U.S. Senator From the State of South Dakota

Mr. Chairman, thank you for scheduling this second hearing on the status of our Nation's infrastructure. This issue is critical concern to everyone.

As a Senator from South Dakota my primary concern is the deteriorating rural roads, bridges and other public facilities. Recent studies have found rural highways and bridges deteriorating at unacceptable rates. Many of the bridges were built several decades ago when farm machinery and trucks were much smaller. The larger equipment used today speeds up the aging of these roads and bridges. Rural air service is also a continual problem.

Small rural communities also have very unique water supply and wastewater treatment problems. In much of South Dakota good quality water is not available to communities. The ground water supplies in many areas do not even come close to safe drinking water standards. To address this problem, I have worked to develop rural water systems to serve several rural communities and the surrounding farmers and ranchers.

The WEB pipeline project is nearing completion. The project will provide good quality Missouri river water to a 10 county area in Northcentral South Dakota. When completed, the project will be the largest rural water system in the United States. It will resolve water problems for dozens of rural communities. We are also working to have another large rural water pipeline project constructed in western South Dakota. The water quality and availability problem is even more severe in this area. The proposed project would also provide good quality water to residents of the Pine Ridge Indian Reservation. Currently many Indians on the reservation either have to haul water fifty or sixty miles or use polluted water from streams. The water in the streams is polluted because it is often used as the sewer system also. These infrastructure problems are much different than the problems of New York City or Washington, but they need to be addressed. These rural area cannot get industry to come into the area without good quality water.

These cases in many respects are similar to developing nations. Without an infrastructure to provide basic needs and transportation these areas can never be developed. It is important that the committee keep in mind the unique problems that exist in rural areas when it looks at infrastructure issues.

Mr. Chairman, I look forward to hearing the witnesses and to working with other members of the committee on this important issue.

Senator MOYNIHAN. Sir, we thank you once again, Mr. Horsley, and not for the last time. We will be hearing from you and working with you. This is beginning to emerge as something where we are beginning to think to some purpose on this point. Thanks to your coalition and to your own very concise and hands-on sense of the subject. We look forward to continued interest.

Mr. HORSLEY. Mr. Chairman, if I could, I would like to request that a new study be placed on the record which the National Association of Counties has just come up with, entitled "America's Counties: Public Works Leaders." I would like to place that on the record of this hearing together with the remainder of my testimony.[1]

Senator MOYNIHAN. Thank you very much.

Senator BURDICK. I have a question of this gentleman.

Senator MOYNIHAN. Mr. Chairman, would you forgive me. I am going to have to slip away to the Finance Committee for just a moment.

Senator BURDICK. You presented some very alarming testimony about the municipal bond treatment in the last Tax Act. Suppose the correction is not made as you suggest, where will these communities get their money?

Mr. HORSLEY. In my view, Mr. Chairman, many of those communities will simply wait, defer, and the unfortunate aspect of that is when you defer important maintenance—you know, the old Fram Oil Filter ad, "Pay me now, or pay me later,"—it will come back and bite you in the rear end with a much larger cost.

So the unfortunate aspect of this is that many of those projects will simply be further delayed and the cost will go up.

Senator BURDICK. I am sure you are aware of the situation that many communities face with bond issues. I have known bond issues to be on the ballot five or six times before it is passed.

Mr. HORSLEY. Absolutely, Mr. Chairman, I think that you have put your finger right on it. When there is a cutback in funding from the Federal level that no longer matches our local efforts, then when you put an issue on the ballot and say that it has to be 100 percent funded out of the local pocketbook, rather than matched by some ratio, our voters are not dumb.

You go to them with a deal and say, half off, the Federal Government will match us or the State government will match us, they will step up the line faster than when you say that all the burden has to be paid locally. It is unfortunate because we are going to slow down the effectiveness of passing these local bond issues.

Senator BURDICK. What are the chances, in your opinion, of making any change in the municipal bond treatment?

Mr. HORSLEY. I am not optimistic that we are going to do it this year, but as we have spoken to more and more leaders in Congress, more and more of them are tuned in to the fact that some damage was done and needs to be corrected. So this coming year, I am hopeful that bills are going to be introduced, hearings held, and possibly some correction will take place.

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[1] The study referred to has been retained in committee files.

Senator BURDICK. From the investor's point of view, he doesn't gain much, does he, by investing in a municipal bond today?

Mr. HORSLEY. I think that there are other panelists that are more able to address that than myself. I am a down home boy, and I don't buy very many bonds, period.

Senator BURDICK. Yes, I have used that farm boy thing myself. Senator Symms.

Senator SYMMS. I have no questions right now, Mr. Chairman, thank you.

Thank you for being here, Mr. Horsley.

Senator BURDICK. Thank you very much.

Mr. HORSLEY. Thank you, Mr. Chairman.

Senator BURDICK. Ms. Rutledge is our next witness.

STATEMENT OF NANCY S. RUTLEDGE, EXECUTIVE DIRECTOR, NATIONAL COUNCIL ON PUBLIC WORKS IMPROVEMENT, ACCOMPANIED BY MICHAEL BELL, DEPUTY EXECUTIVE DIRECTOR

Ms. RUTLEDGE. Good morning, Mr. Chairman and members of the subcommittee. I am very pleased to be invited to speak to you this morning about the work of the National Council on Public Works Improvement.

We have had about 18 months to produce several reports to you, as well as a number of hearings, and a public outreach program. That outreach program is not just a public relations gimmick but, an opportunity that we have taken at every step of our research to test our findings with people who are on the working line of infrastructure.

Our final report for the National Council on Public Works Improvement is right now in production. We had hoped to be a little closer to finish at this stage, but it has truly been a very difficult task. We expect, however, to fully finish our work within the congressionally mandated time frame and within the budget that was authorized.

A longer description of our research and outreach program is available in my written testimony, but I will just briefly tell you about it. I am sure that the members of the subcommittee can expect to hear a great deal today, about the magnitude of our nation's infrastructure needs based on various estimates.

It is, indeed, an appropriate and necessary place to begin a policy discussion, but ultimately the numbers, in themselves (which are generally very large) offer very little policy guidance and tend to invite paralysis rather than constructive action.

They also tend to mask a lot of "business-as-usual" assumptions about technology, operations and management that may, in fact, be more appropriate to the 1950's than the future.

Instead of analyzing public works needs as if they were ends in themselves, or the facilities like historical monuments, we have tried to take a look at the services that these facilities provide, services like the movement of people and goods, clean water, disposal of wastes, protection from floods.

These are all things that the American public feels passionately about. The actual specific facilities, they could care less in most cases. The services are indeed very important, and serve as underpinnings of our American economy and our quality of life.

In many cases, I think, the public's lack of enthusiasm about specific facilities may perhaps be warranted. In fact, there is a lot of evidence to indicate that we haven't done as great a job as we might in terms of managing, maintaining, keeping those facilities running in good working order. In fact, I think that there is a good deal of question about how we do that. Government has the responsibility to provide those services first and foremost; but the way in which they provide them, I think, is open to a lot of different questions.

In our efforts to analyze this issue on behalf of the Congress and the President, we have tried to explore the definition of needs on a much broader basis—to open up the terms of the debate beyond the dimension of need per se and specific financing options, but also to look at questions of technology and management decisionmaking, our expenditure trends, and other elements that help us to guide policy decisions in the future.

That first report, "Defining the Issues," which came out in September, essentially established the research program of the council. We followed it up in July of this year with a nine-volume set that has looked at every specific category of infrastructure within our aegis, and tried to draw much more specific recommendations. These were done by independent contractors, with independent conclusions, but they have provided very important grist for our council.

It might interest you to know that we have already distributed about 4,500 copies per requests of the first report, and perhaps 20,000 cumulatively of the second report to people all over this country and, in fact, all over the world. Our first report has already been translated into Japanese, and it has been published in Japan. Our second report, I understand, is underway as well.

Some of the themes that I think are most important that emerge from our series of nine reports and our previous work is, first of all, that America is not in ruins. In fact, many of our systems work fairly well. There are obviously big differences in our country, and there are big differences between different modes of infrastructure. But, in fact, there is evidence, very troubling evidence, to indicate that we are not keeping up with a pace of investment to meet future needs. In fact, what we are doing is living off past investments, without making a commensurate reinvestment of our own for the next generation.

All of the studies very strongly emphasize the need to define and refocus government roles as was discussed earlier today. Accountability, efficiency, decisionmaking, the speed of decisionmaking, are all in great question, given the uncertainty and ambiguity of our current roles of government.

In general, most of the studies emphasize placing the responsibility and the accountability primarily on State and local government, away from the Federal Government. It does not deny a Federal role, but it merely reemphasizes the need to define it much more clearly in the future.

The financing options were generally aimed at one basic goal—to make better use of what we have as a partial substitute, not a complete substitute by any means, but a partial substitute for major expansion and new capital.

The potential for new investment in technology is also strongly emphasized in all of the studies, and particularly the environmental areas. The problems of small cities, in particular, are facing some very expensive regulatory requirements and also a great many new demands are particularly emphasized.

This is an area that has worldwide concern and market potential. If I may for just a moment tell you about a fellow who visited our office last Friday from Austria. He had been in the country for several weeks, exploring market opportunities for his company, a major construction and design firm for trenchless pipe laying.

As you well know, a good deal of the cost for water and waste disposal services is cutting up the ground, oftentimes through very densely populated areas, to replace, repair, or lay new pipe. His company, as well as a dozen others in Europe, and apparently at least 20 others in Japan, have already produced varying types of technology which enable lines to be repaired or replaced cut without cutting up the ground.

He was surprised to learn that, in fact, there is only about one company in this country that has apparently explored that area. There may be more, but he was unable to find them. In fact, he found a great deal of interest among public works directed in the market. What appears to be the case is that we are going to see a great many more European and Japanese contractors moving into the United States market this particular area.

Again, I hope that this can he proved not true, but it was troubling to think that perhaps we are falling behind in this critical area, one that has critical importance to us in terms of the cost of infrastructure repair and replacement, as well as new infrastructure. Also there is a world market out there that the United States could potentially tap into much more effectively with more research and development.

The council has looked at a variety of other issues such as the relationship of our economy and infrastructure, international comparisons of various kinds, the performance measures that we use to determine what we are getting for our money, along with technology and innovation, and intergovernmental issues as well as finance. All of this material is going to be brought together into a final compendium of research by the end of this year. The members of the council also expect to produce some policy recommendations.

The council is going to try to distill all of it down into some clearly stated recommendations, which we hope will have value to this Congress, but also to State and local leaders throughout the country who are dealing with public works question every day.

That task is extraordinarily difficult. As you well know, there are a great many perceptions and different perspectives throughout the country. Nevertheless, we are trying to find consensus on some basic questions. The first one as we have heard about today, what level of national public works spending is appropriate and necessary.

We really can't answer that in a definitive, quantitative fashion because, in fact, the question of what service we get for that facility isn't always tied to how much we invest. By the same token, we know that we need to invest more, and there is evidence, I think, of living increasingly off past investment. It may well be possible to substitute capital investment, or some portions of capital investment, for different kinds of low capital, low cost solutions.

The council is also looking at how public works should be financed and expects to have some very specific suggestions on that question. Each category of public works has different options, but there are some very basic strategies that cut across. I think that one of the most important ones, particularly in growth regions, is the benefit principal. The people who depend on and benefit by infrastructure improvements should be paying, if not all, certainly a larger load of the cost on an equitable basis, of course. This is particularly important for areas of new development.

Another is the question of spending of public works trust funds at the rate at which revenues are collected, within reason. Enhancing State aid—we know, for instance, that State aid is not a major portion of infrastructure financing at the local level but, in fact, State governments hold the power of the purse for local government, which creates some enduring problems and strife there.

We are also looking at the impact of tax reform. This is a very important question to the council as well—what it means not just in terms of specific provisions, but also in terms of capital formation on an overall basis—the availability of capital for State and local public works projects. There are some important macro dimensions of this besides the problems of specific provisions, that we want to be able to comment on to you.

We are also looking at how we can use the resources we have better. That is both a manpower and the management problem, as well as a question of public accountability. One measure here that is important to suggest that is comprehensive capital budgeting in which all levels of government help to generate better comparitive information that gives them a clear sense of what they are investing in and what they are getting for their investment, both in terms of construction, rehabilitation as well as maintenance. This is not necessarily specifically oriented at a capital budget, but it is a budgeting process that really tells us what we need to know.

We are also looking at ways of increasing maintenance and expanding the incentives for maintenance in such a way that we get a better guarantee that the money that we are putting into new investment is going to last. Unfortunately, the evidence that we have seen so far suggests that maintenance is short-changed throughout the country and, in fact, creates many of the problems we are facing right now. It is difficult, it is not politically popular, but it is perhaps one of the most important elements of a public works program.

We are also looking at performance measures in some detail. We would like to be able to present a basic outline that will give you all a format to think about the question of the investments we make, and perhaps to guide State and local governments to make better investments as well.

The roles of government—again, this may be one of the most difficult questions that we are facing but, in fact, we are indeed going to at least try to lay out some basic guidelines that are suggested by infrastructure categories. Our aegies doesn't include all of the other categories that were mentioned earlier today, but I think that we can contribute significantly to the question of government role definition.

The question of development and implementation of a public works innovation, essentially, the R&D budget, is a high priority to us. As you may know, we worked with the National Academy of Sciences and the National Academy of Engineering to explore that question in detail, We have just received their final report and expect to be able to make some cogent statements about that.

All of these things do not yield simple answers, quick fixes, or simple solutions but, in fact, what we hope will be a broad-based incremental program that will apply to all levels of government and the private sector that will make a serious, significant change in the way we operate and maintain infrastructure. It is really too important to allow it to be swept up in simplistic solutions.

I look forward to your comments on our continuing work. If we can provide any support or assistance to the members or the staff of the subcommittee, we would be glad to do so.

I would like to introduce Michael Bell, who is my Deputy Executive Director, to provide support, for any of your questions.

Thank you.

Senator **Burdick**. Thank you very much.

You have referred in your testimony to the existence of several needs reports.

Ms. **Rutledge**. Right.

Senator **Burdick**. They contain astronomical funding estimates. Has the council reviewed these needs reports to determine how reasonable their estimates are?

Ms. **Rutledge**. Yes, sir, Mr. Chairman. We have looked at all of the ones we could find on the national scale as well as many that were done at the State and local level. What we found, in terms of the original national needs studies is that they provided a pretty reasonable order of magnitude.

I think that we could, perhaps, quarrel with certain kinds of methodologies and some of the outcomes, perhaps, but there is a remarkable consistency in terms of categories, not in terms of exact numbers but in terms of magnitudes.

As you well know, many of them were done on the basis of information that was pretty limited. In fact, when I worked in the State of Washington myself, I participated in some of those and I know how weak, in many cases, that information was. But they have an important role, to give us kind of a sense of the order of magnitude of the problem, the importance of the problem.

I think, however, it would be fair to say that we have a great deal more work to do to help refine those numbers into something that is a lot more meaningful. They really have to be built from the bottom up, with the involvement of communities and then with the State government, before they become nationally useful. It is a starting place, however.

Senator BURDICK. The rising urban and suburban traffic congestion has led to increased demands for more roads. Would that be viewed automatically as a need, if there are some viable alternatives to more highway construction?

Ms. RUTLEDGE. At some point, Mr. Chairman, new highway construction is inevitable, and I think that we can't dodge that. There is clearly a need for new investment in that category. Certainly, our expert consultants in that area strongly supported that idea.

However, I think that it can also be said with equal certainty that there are a great many more things that we can do to help reduce the cost of new investment by using those facilities we have better. Certainly, that is to look at transportation systems on a broader base, including mass transit as well as highways, other forms of transportation, and perhaps begin to introduce more prudent demand management techniques.

There are both technical as well as operational ways of doing that. Again, I am not a transportation expert, but we have explored a great many of those and it suggests to me that we have a lot further to go. It does not always assume that we need to build, build, build. There are lots of ways that we can accommodate growth with existing technology.

Senator BURDICK. We have a mild crisis. There is a vote on, and we were hoping that one of the Senators would return, so we will be in recess for just a few minutes.

[Recess.]

Senator MOYNIHAN. Good morning again. We regret having to interrupt the hearing, but we are having votes in the Senate.

Ms. Rutledge, I was not able to be here for your testimony, because Secretary Baker was reporting to us in the Finance Committee on the trade agreement that has been reached with Canada over the weekend, and I wanted to make an appearance on that occasion. But I have read your testimony with the greatest attention, interest, and admiration. We are, indeed, very much looking forward to your report, which we will be getting when?

Ms. RUTLEDGE. I can't give you a definitive date, Mr. Chairman. We hope before the end of this year, however.

Senator MOYNIHAN. You hope before the end of this year, however. When does your money run out?

Ms. RUTLEDGE. We are budgeted through April of 1988, and we are mandated to provide you with the report no later than February 15, but I believe we are going to be well in advance of that. We are going to be under budget and in advance of our final deadline.

Senator MOYNIHAN. In courtesy to my colleague and friend, the former Governor, who dealt with these things in a most specific way, Senator Graham, would you like to ask some questions?

Senator GRAHAM. Thank you, Mr. Chairman.

I was interested in the remarks in your statement under the question: How should government roles and responsibilities be sorted out for change. As I had to leave the room to vote, you were discussing an expanded Federal role in research, reexamination of the Federal role in the regulatory area, and more involvement of the private sector in some public works categories.

Could you expand on what you see as the Federal role in the regulatory area, because I sense from John's earlier statement that, while it may be that the Federal Government will be a smaller portion of the financing of traditional infrastructure, that it has a leadership role in stimulating other levels of government and giving some coherence to their activities. I would be interested in your thoughts as to what that Federal regulatory role might be.

Ms. RUTLEDGE. I believe that the beginning of that is in the environmental area. Certainly, with the Clean Water Act, it is our expectation that that will not roll back in any fashion; probably, if anything, it will be more rigorously enforced.

In terms of solid waste, there is increasing concern about both the volume of solid waste and the hazardous quality of much of it, and that area also was suggested to us as an area for more aggressive Federal regulation, to reduce the flow of waste by a number of methods.

It may not necessarily take the form of regulation, it may be some kind of value added tax that would help to reduce or provide an incentive to reducing waste flow, or it might take the form of more rigorous enforcement of solid waste landfills to prevent intrusion into groundwater supplies.

Those are areas where the State can play a role and, indeed, will play a role. At some point or other, the Federal Government needs to clarify what the basic bottom lines are, not necessarily the technological apparatus, but at least what the regulation in terms of standards are.

Senator GRAHAM. Do you have any further thoughts, or maybe this has to wait until your study is more mature, as to what the strategic role of levels of government should be in the financing of infrastructure?

Ms. RUTLEDGE. Senator Graham, you have definitely picked out one of the hardest questions that we are facing. In terms of giving you a specific outline of those arrangements, I will have to defer until the council has really thought that through. It is a very difficult question, but it is really the heart of their discussions right now.

Regarding the financing role, they are agreed that there should be a continued Federal role in this. The Federal Government cannot completely turn its back on its long-standing that partnership with State and local government. It has been there since the beginning of the Republic. If we are going to meet the Nation's infrastructure goals, whatever they may be, we will have to face increased investment. The council is exploring that issue right now in terms of whether it should be a specific quantitative increase in investment or a broader call to arms. At some point, a portion of that increase may have to be a Federal role.

State and local levels of government are going to have to play an increasing role in this and, perhaps, to a certain extent, the private sector, particularly in areas of new development. There needs to be a more consistent role and a more equitable role of the private sector in terms of developer fees, impact fees, and so on.

Senator GRAHAM. Thank you, Mr. Chairman.

Senator MOYNIHAN. Let me ask, on the question of the Federal role, we kind of fought this out in the 1830's. This is a Trivial Pursuit question, The New York Times, about 5 years ago, ran a series of history quizzes. The question that was most often answered wrong was in the 1830 or the 1820's there was a big battle on internal improvements and which side was opposed, the Jeffersonians or the Whigs. Everyone assumed that the mean old Whigs would be against this, and the open-hearted, generous minded Jeffersonians would be for it. The answer is just the other way around.

Senator **Graham**. One of the benefits of serving on this committee is that for tuition levels substantially less than used to be charged at the institutions that the Professor taught at, you have the benefit of his knowledge.

Senator **Moynihan**. I wanted to ask Dr. Bell a very hypothetical question, and I think that it is one that Senator Graham would agree we have to work at.

Just how feasible is it to try to quantify something like the needs of infrastructure investment to some 4 percent, or 4.5 or 3.5, some idea of capital budgeting, a federally directed enterprise?

Economists will often say remarkably confident things, which can't be all that confident; we no more had our Canadian Trade Agreement signed at 5 minutes till midnight than an economist was there to tell us that this would increase employment and GNP in Canada by 5 percent and in the United States by 1 percent. He knew that before the morning editions were out.

You have been working on this, what do you think?

Mr. **Bell**. The council decided, in the spring of last year, that they did not have resources sufficient to undertake that task. The thrust of the Council's first report was to try to move away from a focus on physical facilities, which had been the focus of needs studies in the early 1980's, and talk about services that are being provided—transportation services, drinking water, and things like that—and alternative ways of providing those services.

I think that it would be difficult to come up with a number, to say that public works spending should be 3 percent, 4 percent or 5 percent of GNP because there are alternative ways of providing the services.

By focusing on services, you shift the debate from current facilities and trying to replicate programs back in the mid-1960's or the early 1960's, when we were spending 3.5 or 4 percent of the GNP on such programs. Rather than simply replicating those programs you need to look at alternative ways of providing services through the type of research you have talked about, where we could, in some cases, substitute communication for transportation.

The State of California, for example, is experimenting with having some of its State workers stay at home and use computers and talk to the main office that way, to disperse some of their back office activities out of the central business district. This reduces the pressures on the traditional transportation routes feeding downtown.

Senator **Moynihan**. That is a nice phrase when you say it, you know that you have heard something, "substitute communication for transportation." When you say that, it is an idea, isn't it?

Mr. **Bell**. Transportation is an intermediate good in itself. I mean, the purpose of transportation facilities is to move goods and services or people. You have seen some of that substitution already taking place in consumer shopping, for example, where you have these television stations that people can look then call in to purchase a product, and they don't have to leave their homes.

I don't know what the implications of a shift in that direction are for what percent of GNP we should be spending on public works, or how we should be spending it. We don't have a very good link between dollar expenditures and infrastructure services.

Senator MOYNIHAN. That is what I think, and you don't think that we are going to get it.

Mr. BELL. I think that it is going to be difficult.

Senator MOYNIHAN. For $2 million that is all we find out?

Seriously, you are thinking very carefully about this, tell us about your problems. In your final report, don't leave out what you couldn't do. Say, we tried this, and we couldn't get there. We thought about this, and you said that $2 million and 2 years was not enough. How much and low long would be, and what was the task that was too big for this time frame and resource allocation?

Mr. BELL. We raised that question in the first report where we said that we were unable to provide some of the information that was requested in terms of age and condition of the capital stock, for example, which would have mandated a comprehensive inventory and condition assessment.

The initiative should be to try to encourage local governments and State governments, who are primarily responsible for providing those services, to develop that kind of an inventory and condition assessment on their own, but that is only a first step. That is a necessary, but not sufficient condition to answer the question that you raise.

Senator MOYNIHAN. Good. We have to get ourselves into thinking about this conceptually. We have gone. We have been moving on a project-by-project basis. We are going to dig the canals. We are going to build the railroads. We are going to lay down the roads. We have followed technology pretty much. I guess the canal technology was all there. The railroads had the machine, and then the highway and the machines.

We haven't done much lately, for our technology business, on transportation. The last real change in transportation was the jet engine, which was the last thing that the British invented before they went out of business. The automobile is a machine from the second half of the 19th century, and the railroad is a machine of the first half of the 19th century. We have not been very innovative, and I think that we ought to try to do some things just to show we can do them.

The Japanese are now experimenting in the field with rail communications that run at 370 miles an hour. The 21st century technology shouldn't be allowed routinely to appear in another country because we couldn't get around to thinking about it. This is what we are going to do here.

Thank you very much, Ms. Rutledge, and thank you, Dr. Bell. We are looking forward to your report, and try to do it by the first of the year, won't you, but if you can't do it right.

We now have a panel of immediately involved and concerned persons and organizations. Mr. Dana Huestis of the Associated General Contractors; Mr. Thomas J. Donohue of the American Trucking Association; Mr. Ted Pappas who is the president-elect of the American Institute of Architects; and Mr. William Miller who is the manager of the Denver, CO, Water Department, and speaking for the American Water Works Association.

Gentlemen, we welcome you, and most especially look forward to your testimony as people who have the actual work to do. Your statements will be put in the record, and perhaps you could summarize it and tell us what you most want us to hear, and we will listen with great attention.

Mr. Huestis, would you begin?

STATEMENT OF DANA HUESTIS, PRESIDENT, ASSOCIATED GENERAL CONTRACTORS

Mr. HUESTIS. Good morning, Mr. Chairman, and thank you. I am Dana Huestis, president of the Associated General Contractors of America. I am also president of Falls Construction Co., a general contracting firm, headquartered in Great Falls, MT.

I am here this morning to tell you six things which I firmly believe about this nation's infrastructure, and then to make six recommendations. Four are recommendations for action by this session of Congress, and two are for consideration next year.

First, the infrastructure crisis is real. As a Nation, we have not been investing enough in our public facilities to either keep up with new growth, or to rebuild and protect what is falling into disrepair.

Second, an adequate infrastructure is the key to economic growth and competitiveness. The competitiveness of American industry and the ability of our economy to respond quickly to changing market conditions and demand is in very large part dependent upon the condition of our Nation's infrastructure.

Third, much has been said about the roles that privatization, increased research and development, improved management techniques, and education can play in assisting economic growth. These elements are indeed helpful, but they will not, in and of themselves, solve our infrastructure crisis. Only through increased capital investment will our nation be provided the public facilities necessary for modernizing a growing and competitive economy.

Fourth, all levels of government must address this crisis. While State and local governments are shouldering more and more of the infrastructure burden, the Federal Government must take a positive stance, providing both leadership and adequate funding in those areas where a Federal role is appropriate and necessary.

Fifth, deferring action on the infrastructure crisis will only result in a much larger and more expensive problem for this Nation to solve later on.

Sixth, the construction industry remains underutilized in this country, and the capacity now exists for our industry to undertake any level of infrastructure program put forward not only by the Congress but by State and local governments as well.

For further action on infrastructure by this session of Congress, AGC makes the following four recommendations:

First, Congress should move quickly to reauthorize the Airport and Airways Improvement Program. Authority for the program was allowed to expire on September 30 despite increasing concerns by all over the safety and adequacy of our Nation's air transportation system.

Second, both the Airport and Airway Trust Fund and the Highway Trust Fund should be removed from the unified Federal budget. Taking these trust funds off budget will ensure that the dedicated funds paid in by the public will be spent for their intended purpose.

Third, AGC urges the Congress to revisit provisions of the Tax Reform Act of 1986, which imposed limitations on the tax exempt financing capacity of State and local governments.

Senator MOYNIHAN. You heard us this morning on that subject.

Mr. HUESTIS. Thank you for that, sir.

Fourth, the Congress should also take action to make sure that congressional intent with regard to the Clean Water Amendments is not allowed to be circumvented by the Office of Management and Budget, which apparently wants the States to undertake the front-end financing of the revolving loan funds with the Federal Government only reimbursing the States after the fact.

For action during the remainder of the 100th Congress, AGC recommends that the following two legislative goals be pursued to address the infrastructure crisis:

First, Congress should enact a capital budgeting process that will give the Congress enough information to make fully informed decisions on Federal spending choices.

Last, but certainly not least, Congress should enact a major capital infrastructure program that would assist State and local governments in meeting their infrastructure investment needs.

AGC has been studying the dimensions of the infrastructure crisis since 1981 and has published six studies to date on the topic, all of which have been furnished. A seventh study is now being prepared analyzing and explaining the vital link between infrastructure investment and economic competitiveness. AGC will, of course, make this study available to the committee as soon as it is completed.

The question of whether the Nation can afford to move ahead with infrastructure rebuilding is the wrong question. The correct question is: Can we afford not to move ahead with increased investment in our Nation's infrastructure? The answer is that we cannot.

In closing, I simply wish to state that while the infrastructure crisis is clearly a challenge facing us, I feel that it is also a great opportunity. American businesses are now facing many competitive challenges. I am confident that these challenges can and will be met if we provide for the public infrastructure which is so necessary for economic growth.

Mr. Chairman, thank you for inviting AGC to participate in these most important hearings.

Senator MOYNIHAN. Thank you, sir, for a very specific statement. We will get back to you as we go along. Before we do that, there is that passage where you say that AGC is becoming increasingly concerned that other pressures on a busy Congress too frequently result in needless delays to securing legislation that the vast majority of Members of Congress recognize as necessary legislation, and the three examples are the highway and transportation legislation, and the clean water legislation.

I don't doubt that Congress had some share in delaying those measures, but it wasn't Congress that vetoed them; right?

Mr. HUESTIS. That is a good point, air, although the veto came in March and the legislation expired on the previous September 30.

Senator MOYNIHAN. I must agree, but the Clean Water Act was passed in the previous Congress.

Mr. HUESTIS. The clean water legislation authorization had expired for 18 months, and the program was funded by Continuation Resolution, but during that interim funding by Continuing Resolution, $600 million fell through the cracks.

Senator MOYNIHAN. I agree, but it is just that we didn't veto the bill. We have a problem because the executive branch doesn't think that we should have these programs at all.

Mr. HUESTIS. I agree, sir, that this is a problem for all of Federal, State and local government. In fact, it is a problem for all of America. These programs take a commitment that must be adhered to.

Senator MOYNIHAN. Mr. Donohue is next.

STATEMENT OF THOMAS J. DONOHUE, PRESIDENT, AMERICAN TRUCKING ASSOCIATIONS

Mr. DONOHUE. Thank you, Mr. Chairman.

I am Tom Donohue, president and chief executive officer of the American Trucking Associations. For your information, I served on Senator Domenici's Private Sector Task Force on the Infrastructure.

You have our testimony. I would like to make a few comments on it, and on some of the other matters that have come up today.

Without question, the greatest civil works effort in the history of the American economy and the American experience is the Interstate Highway System. It is nearing completion. It has 42,500 miles of roads entirely financed by highway taxes assessed on automobiles and trucks in advance of construction. It is a very, very successful effort by our Federal Government.

The second point I would make, Mr. Chairman, there are now, today, problems of congestion, rehabilitation, and additional construction that need the immediate attention of the Federal Government.

Third, we need additional research, which has heen discussed today, in development, to set the highway agenda for the next 25 years. The Nation needs an aggressive highway system to support its economy, its mobility and its competitiveness. There is already a great deal of research underway by the Federal Government, by the private sector, and by commissions and organizations that you are hearing from at this time.

I think the real question for us is just what do we need to support the Nation's economy; where does it have to be; and how do we pay for it?

I think we should continue, for the present, to collect the Federal highway taxes for new construction, for much needed rehabilitation, and for rehabilitation and construction of essential bridges, and in some places secondary roads.

Then, Mr. Chairman, a matter that just about everyone has addressed today, we should spend those funds on highways, not keep them in the trust fund to artificially reduce the Federal deficit. There are $13 or $14 billion sitting there right now. I would echo the suggestion of some previous witnesses that we take the Airport and Highway Trust Funds off budget.

Mr. Chairman, we should not use highway revenues, that is, excise taxes, to reduce the Federal budget deficit, nor should we use it to pay for other expenses within the infrastructure. I would like to make another comment about that in just a second.

I think we should use these highway taxes as they are directed, that is, to build, support and maintain safety and rehabilitate the national system. For example, we now divert a significant portion of revenues we could get from those that consume gasohol. I, for one, think that it is a good idea to develop that technology, but since 1979, we have missed out on approximately $2 billion in excise taxes because they are exempted, and the States lose about $300 million a year.

Senator MOYNIHAN. It comes to $2 billion already?

Mr. DONOHUE. That is right.

Further than that, and I won't go into the other diversions, but there are many suggestions, and some of them are very quiet, they haven't gotten to the surface yet, that when we address our infrastructure problems, the problems of water, sewerage, and so on, that we might look to the highway funds as one source of these revenues. I would encourage the committee, and you, Mr. Chairman, to be very, very skeptical of that kind of a suggestion.

Another point about losing highway revenue, you know, there are a lot of diesel taxes that are not paid. People avoid paying taxes, and they have figured out ways to do that. One of the things that we can do to put more money in the pot right now is to collect the diesel taxes at the distribution level as opposed to the retail level. You reduce by a massive number the places that the tax is collected, and you increase significantly your ability to collect it.

I would make a comment, Mr. Chairman, about toll roads because that option has been discussed in many of the studies. They are generally counterproductive because you pay twice for the road. You pay once for the road, and once for the financing. They particularly are counterproductive when you put a toll on a road that has already been paid for by Federal funds.

Unlike some of my members and constituents, I think I am beginning to see some places where the use of toll roads on facilities, that have not otherwise been paid for and that are needed in the short run, might have some productive use in the future, and we ought to study that. We need some careful research on it.

I would mention, Mr. Chairman, that if we could follow the Federal law on the productivity issues that have affected the trucking industry, that is, vehicle size, axle and gross weights, and access to the points of loading and unloading, particularly in the seven or eight States where we are not able to have those benefits, our members and our constituents would feel much better about the significant increase in taxes that they are paying.

Let me move to a subject that is very important to you this morning and is very important to us, and that is the trucking industry support for a strong Federal role in infrastructure financing. Public expenditures for all these matters are very essential and when we get down to tax policy, we are into a real serious question.

We supported the Tax Reform Act of 1986, but I think that it is time to take a careful look at the incentives that the Government puts into the tax policy to encourage investment in these very important matters.

I would also say, sir, that a Federal program is necessary to serve and promote interstate commerce, and we would oppose efforts aimed at the Federal turn-back of all the revenues and all the responsibilities and all the authority to the State. We certainly need to judge what goes and what stays, but a clear "let's get rid of it" is not in order.

Finally, Mr. Chairman, one personal observation. As I participated in Senator Domenici's committee, and as I looked around this country, there is a range of definition of how much we need to resolve our infrastructure program that runs from half a trillion to a trillion-and-a-half dollars depending on who you speak to.

It is much like budgeting in our office. At the end of the year, people come in and tell us what they are going to need for next year, and if you believe half of it, you double the size of the organization. I think that your encouragement of those who are doing the analysis, such as you just mentioned, to get down to what the reasonable number is, what does the Nation really need, what are our immediate requirements, and how do we finance them, might be the most useful thing that you and your committee could do. If we can define the problem as a Nation, we will find a way to solve it.

Thank you very much, sir.

Senator MOYNIHAN. I couldn't be more supportive of the idea of thinking with some purpose about a subject, and trying to quantify it, put a number on it. The first number is always wrong, but you get better after a time.

We will now hear from the president-elect of the American Institute of Architects, Mr. Pappas. I believe that Senator Graham would like to say a few words.

Senator GRAHAM. Yes, Mr. Chairman.

I want to take this opportunity to welcome my good friend, Ted Pappas, who has represented our State with great distinction in many positions. While I was Governor, I was pleased to have had, as well as the people of Florida, the benefit of Mr. Pappas' service.

In December of this year, he will become the president of the American Institute of Architects, which is a compliment to the institute for their wisdom in selecting his leadership, and a compliment to the professional community of our State.

I am pleased to introduce him to this committee.

Senator MOYNIHAN. He is from Jacksonville, FL. I will claim the distinction to be a honorary member of the AIA.

Senator GRAHAM. Mr. Chairman, I overcome my normal modesty to state that I also have such an honorary membership.

Senator MOYNIHAN. All right, Mr. Pappas, you had better get it straight because you have a bunch of experts up here.

STATEMENT OF TED PAPPAS, PRESIDENT-ELECT, AMERICAN INSTITUTE OF ARCHITECTS

Mr. **Pappas**. Thank you, Mr. Chairman.

Senator Graham, thank you for you kind words.

My name is Ted Pappas, FAIA, first vice president of the American Institute of Architects, and principal in the firm of Pappas Associates, Architects, in Jacksonville, FL.

I am pleased to represent the AIA at this important hearing. Today, I would like to provide the subcommittee with perspectives on the issue of infrastructure that have not received sufficient attention in the public discussion. They are: The role of the architect in creating public works facilities; the definition of infrastructure; capital improvement and land use planning; competitiveness; and the government process for procuring architectural and engineering services.

The architect is a central figure in the infrastructure maintenance and construction process. America's architects recognize the vital importance of the role of infrastructure in a well designed, well functioning environment. This is certainly true regarding public buildings, ranging from city halls to police stations to community hospitals to public schools. But the architect's concern extends far beyond buildings. The architect sees infrastructure as a part of the total community environment, which if permitted to deteriorate at its current pace threatens to jeopardize the quality of American life.

We believe that the definition of infrastructure must be broader and more inclusive. Specifically, we urge that that any future legislation recognize the place of various public buildings in the infrastructure network.

Such structures as warehouses, laboratories, equipment repair shops, and emergency service facilities as well as administrative offices provide very important and very different support from other infrastructure elements, whether they involve highways or water works, airports, or deep water ports.

Flexibility for states and localities to determine their own infrastructure needs and solutions is essential to a successfully integrated, comprehensive infrastructure program.

Federal infrastructure policy should encourage State and local land use planning in both short-term and long-term capital improvement plans. Given the enormous needs and the severe limitations on available resources, it makes sense to consider and provide public works in a timely fashion according to a carefully determined set of priorities.

The creation of a quality human environment depends on the skillful and well-planned integration of all of those elements, none of which can be permitted to break down without impairing and imperiling the entire community.

A survey conducted jointly several years by the U.S. Conference of Mayors and the National League of Cities found that of 805 cities questioned, over 90 percent reported that they either had a capital budgeting process or a substitute which accomplishes the same purpose.

Federal legislation should also amend Federal budget laws and procedures to establish a Federal capital budget so that the assets will not continue to be treated as liabilities, and so that we have a much more accurate picture of the Federal budget.

Infrastructure is an important factor in the Nation's ability to compete in the world marketplace. The smooth flow of goods across the country and out of the country depends on modern transportation and support systems which include roads, bridges, ports, harbors, airports and other facilities.

Obviously, if this Nation wishes to compete effectively, it is necessary to improve the efficiency, usefulness and durability of the structures and systems we create. Research and development concerning construction materials, building components, and the design process should be high priority, and it is not. The United States actually spends no more on the research of buildings than it does on razor blade research.

Federal procurement is governed by the Brookes Act, Public Law 92-582. Many States have adopted mini-Brookes Acts. This act requires that the qualification will be the starting point for procurement of architectural and engineering services on Federal projects covered by the act. That is the way it should be for the architect and the engineer to create a product unique to each problem, and no architect or engineer solves the same problem in precisely the same way.

In 1985, the AIA completed a comparative study of two States' architect/engineer selection systems. The study showed conclusively that the Brookes Act procurement system used in Florida, under Governor Graham, was only half as expensive and took only half the time of the price-based system used in the State of Maryland. Maryland has since changed its price-based law to the Brookes type process.

I would like to close by emphasizing that the Federal Government must be a fully involved partner in improving our infrastructure. The national interest in better public works facilities is clear, and so is the Federal responsibility.

The subcommittee has embarked on a important legislative journey and the AIA looks forward to taking it with you. Thank you.

Senator MOYNIHAN. Thank you, Mr. Pappas.

You skipped over a reference to a Highway Administration study of the increased cost of transportation associated with road levels of maintenance of some $69 billion in 1981, 1982, and 1983.

Let's now hear from Mr. Miller on behalf of the American Water Works Association.

STATEMENT OF WILLIAM MILLER, MANAGER, WATER DEPARTMENT, DENVER, CO, ON BEHALF OF THE AMERICAN WATER WORKS ASSOCIATION

Mr. MILLER. Thank you very much, Senator.

I am very privileged and honored to be here this morning and appear before this subcommittee on a matter of great importance to you and of great importance to those of us who have the responsibility of providing infrastructure.

In my capacity, I am here wearing two hats. I don't want you to think that I have a split personality, but I am manager of the Denver Water Department, and I am also here on behalf of the American Water Works Association.

AWWA is a scientific and educational association of some 40,000 members, and I am one member of that 40,000. AWWA is 106 years old and has represented and been concerned about the water industry in all of that period of time.

Our Denver water system is not quite that old. We were established as a municipally owned water utility in 1918. Prior to that, in Denver, from 1858 on, water was provided in the community by private utilities, for-profit utilities, and that was changed in 1918.

Presently, my organization is charged strictly with the responsibility of potable water. We are an independent agency owned by the city. When I say, "independent," I mean independent in the true sense in that the people of Denver, in the charter, in 1918, gave us the responsibility of planning for developing a water supply and making it self-sufficient.

We do not go through a city council for any kind of an appropriation. We do not depend on the city council or the city government for our funding. Our board of directors, five members appointed by the mayor, has the complete authority from the people of the city to set rates and to set rates sufficiently to provide a good supply of water at the lowest possible cost.

We are fairly unique in that kind of a governmental set up, and I find that it is unique in dealing with AWWA and other major utilities that I meet with across the country. I might even say that they are somewhat envious since we do not have to deal with the city council in our budgeting procedure.

In the drinking water industry, there are large and small utilities, of course. There are over 200,000 total water suppliers in the country that bring water into homes. The large systems, such as Denver, only represent 5 percent of that total number of suppliers, and yet we supply over 70 percent of the people.

Nonetheless, I believe that size is tremendously important. These smaller utilities have tremendous difficulties in arranging their financing, I believe, and in meeting the standards that are being set constantly for the protection of the health of the people.

As an example of that, in Denver, we have a small suburban city adjacent to us, less than 2,000 people, and they have 23 separate water and sanitation districts in that small community. The way that started was that it is a fairly exclusive community, four or five people got together, dug a well, and then set up a water and sanitation district, elected a board that administered that particular district. In those kinds of districts, and others that are somewhat larger, I think they are having more and more difficulty meeting the standards that are being set in all areas.

We, in Denver, are fortunate in being able to meet those standards, but to make sure that we are, as the amendments are being set by Congress and implemented by regulation, as more and more quality questions are being looked at, we have just finished a $1 million addition to a laboratory that we thought was state-of-the-art 5 years ago.

We are also in the process of expending $25 million on a pretreatment facility at one of our treatment plants that seven years ago was no particular problem because the quality of the water supply was very good. But the quality of water, even though our basic water is surface supply coming from the Rocky Mountains, there is degradation setting in because of encroachment on the water supply.

As we look forward, we have other questions that we are going to have to resolve. We have a process of trying to plan ahead. Our planning now is going through the Year 2035. It is necessary to do that in a water treatment facility. We are in the process now of planning a major reservoir.

We have been involved, through the NEPA regulations, in doing an environmental study that has been going on for 6 years now at a cost of $40 million. As part of that study, we are providing mitigation for this particular project that is going to cost an additional $45 million over the cost of construction.

We are not complaining about that, I am just bringing it to the committee's attention to say that in this day and age, water utilities, as one of the things that you are concerned about in talking about the infrastructure, water utilities and I think others, now have costs to take care of that they didn't have 5, 10, or 15 years ago. So we have to incorporate those costs also into the budget as we prepare the budget and do our planning.

My budget this year in Denver is approximately $120 million. More than half of that, $45 million, is for capital improvement. We think that it is necessary to have that kind of a budget to replace and keep the infrastructure in as good a shape as we possibly can, and we do that by a long-range 10-year capital program, and do replacement on a regular basis.

AWWA believes that water utilities should be self-financed and that the user should basically pay the cost. We recognize, however, that some of the smaller utilities have a great deal of difficulty, so we do advocate some kind of a revolving loan system where financing would be available on a payback basis, perhaps with a low interest loan of some kind.

The State of Colorado does have what they call a Water Conservation Board to which the legislature appropriates a certain amount of funds every year. The board, representative of the entire State, then studies the applications that come in for loans for small dams and improvement assistance, and makes loans on a repayable basis.

In Denver, we finance our water system in a variety of ways, but basically the foundation is through rates that we charge for the service. Those rates have to be sufficient to pay back interest on bonds and principal on bonds. We have a system set up by the people where major capital systems can be financed through general obligation bonds, but those general obligation bonds issues must be approved by a vote of the people, and we must pledge that those bonds and principal will be retired by the water rates, and in no way encroach upon the property owner.

So we have a debt of some $265 million, but we think that is appropriate for major capital, because we figure we must give the people, 20, 30, 40 years from now, who are going to be using that system, the opportunity help pay for it. So we do financing over 30 to 40 year period.

Senator MOYNIHAN. Mr. Miller, a vote has been called, and because I want Governor Graham to have an opportunity to question you all, we thank you very much for that testimony.

May I just make a general observation. Not one of you gentlemen has spoken of a Federal role in these matters.

Your water in Denver comes from the Colorado River in some considerable measure, does it not?

Mr. MILLER. Parts of it. It is basically from the Platte River.

Senator MOYNIHAN. The Platte River, but the Colorado is part of your system.

Mr. MILLER. Absolutely.

Senator MOYNIHAN. Who drilled that hole through the Rocky Mountains?

Mr. MILLER. We did, one of them.

Senator MOYNIHAN. I think we did.

Mr. MILLER. You are referring to the Big Thompson System.

Senator MOYNIHAN. Right.

Mr. MILLER. That is an irrigation system to the north of Denver. We built our own tunnel 23 miles long.

Senator MOYNIHAN. Good for you, but basically that whole Colorado River program is a Federal program.

Mr. MILLER. Not in Denver, no, sir.

Senator MOYNIHAN. The distribution of the Colorado River water——

Mr. MILLER. There were a great many of Bureau of Reclamation irrigation projects.

Senator MOYNIHAN. Exactly. Don't tell the poor Bureau of Reclamation that they didn't do it, it took them half a century.

Senator Graham.

Senator GRAHAM. You have, I think, each pointed to the Tax Reform Act of 1986 and its limitation on the tax free financing as a problem area. Are there any other areas of Federal assistance to State and local governments which would affect their capacity to deal with infrastructure financing that you would like to bring to our attention?

Mr. HUESTIS. I would, sir, on the Clean Water Act, where the new legislation has converted the program from a grant program over time to a revolving loan program. It has come to our attention now that the executive branch, OMB, has decided that they will reimburse the States who are, in turn, financing muncipalities, and they will reimburse on an after-the-fact basis.

So your question, Senator Graham, was, what can be done at the Federal level to help States aad local municipalities get these public works programs in place? The Federal Government should provide the revolving loan funds to the States so that the States, and in some instances localities, can put their matching funds with it, go ahead and bond and get a program going such as the Denver Water Board has.

But if the Federal Government operates on an after-the-fact letter-of-credit reimbursement basis, the new legislation didn't do anything because the idea was to put money in the hands of the people who need to spend it so that we can get those improvements in place.

Mr. PAPPAS. I would like to respond with the goals of the Rebuild America Coalition, which are: (1) to halt any further funding reductions in Federal infrastructure improvement efforts; (2) the release of funds sitting in the Highway and Airport Trust Funds; (3) an end to Federal restrictions on the use of tax in financing for infrastructure purposes; (4) creation of a Federal capital investment program aimed at States and localities infrastructure needs.

Mr. DONOHUE. Senator, I think that a lot of these things that everybody is talking about are very complicated, and it takes a lot of time, and you have to enact legislation. If you want to do something in the short run about improved safety in the air and on the highway, if you want to move forward on infrastructure construction that has an effect on all of our citizens, you want to take the money that is in the trust funds for airport and highways, that has already been paid by the users, and put it in play. Take it out of the bank where we are hiding it to artificially change the deficit, and put it where it belongs, to improve the transportation and safety in those transportation areas.

Senator GRAHAM. Yes.

Mr. MILLER. Senator, just speaking as one small part of the overall problem, infrastructure in the water utility business, it might be worth looking at to see if there is any possibility of some kind of Federal seed money going to States in some kind of a revolving loan program for many of these projects.

I think many times we think in terms of the great big projects. There are so many in every State, I believe, many, many small projects that are waiting that need financing and need help. I think that some kind of a small loan program from that kind of seed money could be very beneficial to States.

Senator MOYNIHAN. Senator Graham's beeper is telling us that we have to go to the floor. We will recess, but if you, gentlemen, would be good enough to remain, it will not take us that long to return.

Before we do, let me just say, we have had a decade of a national administration deploring and denigrating the Federal role in anything. Here it is the end of the decade, we have people coming, major national associations, asking for a Federal program, and I agree with you that there ought to be one.

We will be right back.

[Recess.]

Senator MOYNIHAN. We will continue with our panel. Senator Graham was asking questions, having been very much involved himself with these matters as Governor of Florida. Would you like to continue?

Senator GRAHAM. Yes, thank you, Mr. Chairman.

A concern that I have is that the suggestions for Federal assistance to the States have been in the form of facilitating debt financing. In the first session that we had on this subject several weeks ago, it was pointed out that there had been an initial proposal to finance the interstate system by issuing Federal bonds.

Subsequently, President Eisenhower and Members of Congress at that time discarded that proposal and went to a pay as you go system, and we are the beneficiaries of that. We think we have a Federal deficit now, we would have substantially more if we were financing the cost of our interstate system.

I am concerned that we don't lapse into an immediate response to how to finance infrastructure that essentially says: This generation is going to shift that financial burden to the next generation.

If you have any suggestions as to what would be the appropriate next debt and immediate financing, or how one should go about thinking about that issue in economic terms, and then what would be some means such as direct charges to users, which the interstate system used, to provide for a pay-as-you-go component to our financing of infrastructure.

Senator MOYNIHAN. The panel spontaneously responds to a large question, a very large question.

Mr. HUESTIS. I would suggest that financing of public works improvements, such as infrastructure investment, and the manner in which those mechanisms ought to be structured, depends primarily on the constituency for that system.

You asked, Senator Moynihan, what is the Federal Government's responsibility in all this area? I would suggest that there are different responsibilities among the different systems because the constituencies are different. Probably the best example is our Nation's waste water system. It has no constituency. Once we have used it, we are finished with it.

Probably the greatest and best understood constituency of all the systems is in potable water. Historically, this has seemed to be able to solve its problems. That is not to say that you don't have concerns, but they are best able to deal because they deal most closely to it, and it has a great constituency.

I would suggest that the appropriate Federal role in all of this is to decide, in a very reasoned fashion, which of the constituencies is truly a national constituency, and I would suggest that the best example of that is the interstate system. That was, as Senator Graham pointed out, funded by user fees.

There are answers to these. There isn't a question that has been asked yet that there isn't an answer to.

Mr. DONOHUE. Senator, one of the points that occurred to me as you were structuring your hypothesis was that if you create the debt on the local level, you have, as you said, shared the cost with future generations.

If you choose to help avoid that by having some direct Federal granting, you create the debt on this level, because we are already running a significant deficit, and to add sufficient funds to infrastructure, we would have to increase taxes or find substitute expenses, or create more debt.

I am very, very much attracted to user fees. I think that on the interstate system it works well. It has proven itself to be very effective in some water systems and some mass transit systems over time. I think that would be attractive.

I agree with our friends on the contractors that when you get into waste water, when you get into certain other systems, who is the user, and how do you collect the fee? Do you wait to get sufficient fees in the bank before you build the system. I think that this is when you need a cooperative effort.

The other thing that we find is that so many of our systems of infrastructure cross State lines, cross community lines, cross county lines, that there has to be a State involvement in local affairs, and there has to be a Federal involvement in State affairs. There has to be a cooperative arrangement.

I think sometimes we deceive ourselves by saying, we will get Federal funds to do that. You know where they come from, they come from local people. On the other hand, we deceive ourselves by saying that we will give the local community all sorts of tax benefits, and then the Federal Government will stay out of it. This is an integrated system. If we give a tax advantage, which may well be positive, then the Federal Government is giving a subsidy because we are going to take less income taxes.

I would say that the research and the development into ways to do creative financing, into ways to put the burden on those most likely to use it, to find the best way to put the State, the Federal and the local people together to get the most cost effective way to do it, is what we need to do. There is no simple answer to this, and there is no way of hiding the fact that eventually the local citizen is going to pay for it.

Mr. MILLER. May I just add to that, Senator, that I did not want to leave the impression that the water industry as a whole in the United States does not have any infrastructure problems. We all know that that is not the case. AWWA figures indicate that we spend maybe $4 to $6 billion a year on water systems, but the same research indicates that we probably should, as an industry, be spending upward of $10 billion a year.

Senator MOYNIHAN. Do you think that you are disinvesting?

Mr. MILLER. Yes, in some cases.

Mr. DONOHUE. The same argument might be made, sir, for some of the secondary roads or bridges, and other roads, that are not on the primary system. The question of disinvesting is a very strong one.

Mr. PAPPAS. Senator, also, there is nothing wrong with sharing with future generations because they, too, will be the beneficiaries of the infrastructure. So I think that this is a thesis that could be assumed.

Mr. HUESTIS. Could I suggest that there is not always a cost associated with infrastructure investment. The cost of human resources and the rolling stock of commerce delayed by gridlock on our roads, streets and highways—that is money that is being spent.

Our suggestion is that for the same economic cost you can have infrastructure investment. You can build usable public facilities such as highways, roads and bridges, to get the people where they are going. There was no cost, the money was being spent, but it is just a question of whether it is being spent for productive or nonproductive purposes.

Senator MOYNIHAN. On the interstate, you had the issue that you could tax a nation, a national constituency, while you built segments of the interstate. You could not have commenced the whole thing at once, not even the Associated General Contractors. But the taxes started being paid by Alabamians long before the first segment, and that appeared in Alabama.

In the main, borrowing has enabled you to proceed with investment, which is what it is all about, whereas if you have to save it up before you do it, you will have a long time lag where you will have the same kind of concerns.

Could I ask for two things. We will have a hearing on bonds, and I think that it is very clear that the Federal tax policy, to the degree that it affects decisions on direct capital flows to these areas, is, in fact, infrastructure policy. One of the great things in government is to find those hidden policies that you don't think relate to anything else.

I think that we will look at what we did in 1986, and we will investigate this question that Senator Graham discussed, what are the tradeoffs here. I know that you are asking for the trust funds to be off-budget, but may I suggest to you that this is not going to be a very useful argument. We have put the budget together, and we are not going to start taking apart. But if you want to help this committee and the purposes that you have all advocated, I think that there is a degree of intelligent advocacy about the role of the Federal Government.

You can't associate yourselves entirely with people who denigrate and despise the Federal Government at one level, and then come in and in another forum ask for something very different. Even my very good friend, George Will, who is a conservative, says that there is nothing the matter with building your country, and he is disposed to tell luncheons of the Association of General Contractors, and like that, as they sit around and bash away at the Federal Government, the salad that you have just eaten was grown in the Imperial Valley of California, which used to grow nothing but rattlesnakes until the Federal Government got water there through the Colorado Project.

Is that right, Mr. Miller?

Mr. MILLER. That is correct.

Senator MOYNIHAN. It hasn't changed the mind of many bankers or contractors, but still it is a point to be made.

We thank you very much for your testimony. It would not be appropriate to ask you to wait through another vote. We will be back to you. Keep in touch with this inquiry, will you, and help us out. Tell us when you think that we are doing things well. This is not the last thought that any of you will have on this subject, so don't hesitate to write.

Mr. Donohue, you are here in town, aren't you?

Mr. DONOHUE. Yes, sir, that is right.

Senator MOYNIHAN. Don't hesitate to come around.

Mr. Pappas, you are always welcome from Jacksonville.

You, sir, we will keep Denver, CO, in mind. We thank you for coming all the way east to testify on that most elemental of things. You can live without all manner of things, you can even live without love, but you can't live without water.

Mr. MILLER. We are well aware of that, Senator. Thank you.

Senator MOYNIHAN. Thank you all.

[Recess.]

Senator MOYNIHAN. It is a bit unusual for us to have so many votes in a morning. This was the State Department authorization bill, we had to express our views on that.

We welcome you, and we welcome you as the representative of the National League of Cities. If you would like to summarize your testimony, which will be placed in full in the record, of course. Why don't you tell us what you think on the subject, and tell us what you think about what you heard this morning.

STATEMENT OF BETTY ANN KANE, MEMBER, D.C. COUNCIL, ON BEHALF OF THE NATIONAL LEAGUE OF CITIES, ACCOMPANIED BY FRANK SHAFROTH, DIRECTOR OF FEDERAL RELATIONS

Ms. KANE. For the record, I am Betty Ann Kane, a Councilmember here in the District of Columbia. I am a member of the National League of Cities Transportation and Communications Steering Committee, and I am here testifying on behalf of the 16,000 cities and towns that the National League represents on local governments' ability to finance and maintain our infrastructure.

I will summarize some of my testimony, because some of the statistics you have already heard from previous witnesses.

The League's membership did a 1986 research report which found that one-third of all municipalities believe that their current public infrastructure systems pose a serious threat to the health and safety of their citizens. Sixty percent of the cities surveyed estimated that to meet those needs and correct those threats would require a doubling of municipal expenditures. Twenty-four percent estimated that it would take a tripling of current expenditures.

Senator MOYNIHAN. I have read that in your testimony.

Ms. KANE. It is an extraordinary number.

At the same time, the report found that cities and towns are unlikely to maintain even their current spending levels for public works if further reduction occurs in Federal funding. This study, I would point out, was done before the revenue sharing program was terminated.

Even though the study found that three out of every four local officials believed that their city's capital spending was considerably lower than it ought to be, constraints on capital spending make it unlikely that they would be able to increase their financial commitment. This is particularly because of changes in the Tax Code that have reduced the ability of local governments to finance basic infrastructure.

Senator MOYNIHAN. There is the Tax Code again.

Ms. KANE. The loss of Federal assistance, most significantly revenue sharing, has had a devastating impact on cities already in fiscal distress. The major question for municipal officials is how to finance these public needs, especially at a time when the Federal Government is not only abandoning its partnership with the cities, but it is undercutting the ability of cities to meet the needs by themselves.

We believe that there are four critical contributions that the Federal Government must make. They are, first, some form of targeted financial assistance for the Nation's cities and towns that are in the greatest fiscal distress; second, Federal taxes paid into trust funds for public infrastructure purposes should not be artificially withheld, that is the Highway and the Aviation Trust Funds; third, we cannot afford to waste the Nation's capital investment in low income housing; and, fourth, the Federal Tax Code and IRS regulations must be reformed and simplified so as not to discourage, tax, or penalize public capital investments.

On the question of revenue sharing, I might point out that for most smaller communities, revenue sharing was the only form of Federal support that they ever saw, and that small cities and towns are particularly impacted because more than half of them used between 75 and 100 percent of their revenue sharing money on capital projects, such as streets, roads and sidewalks that are deteriorating. Fifty-one percent are going to cut back on funding for streets and roads because of the loss of revenue sharing.

Nevertheless, governments are doing what they can locally to raise revenues to finance local needs. They are constrained by State laws that limit their ability to raise property taxes. Nearly half of the respondents said that they are at their State property tax limit, and many more are close to it. Eighty percent of cities that had sales taxes are at their State imposed limit.

For municipalities, most of the quick solutions—capital cutbacks, new fees, impact fees, user fees, hiring freezes, and contracting out—have already been stretched to the limit. They are in no position to spend money that is not there on public roads and facilities.

The survey shows that there will be a greater reliance upon general obligation municipal bonds to finance public infrastructure, but there are some very grave difficulties there. First of all, the loss of revenue sharing means that the municipalities in the greatest fiscal distress will lose the greatest amount of funds because revenue sharing was provided on a formula basis that helped their credit ratings. Now without revenue sharing, your credit rating is reduced. Lower credit rating, in turn, translates into significantly higher borrowing costs.

Senators Durenberger, Sasser, and Heinz, all proposed legislation to create a targeted fiscal assistance program, and we do believe that such a program is critical if we are not going to leave many of our cities and towns behind.

On the tax law itself, in addition to the indirect effect that the loss of revenue sharing has had on credit ratings, the tax law has done exactly the opposite of what it was supposed to do, which is simplify the Federal Tax Code, when it comes to the cities and towns.

More than a year after the new law's retroactive date of initiation, Treasury has still not issued any of the key regulations for municipal debt issuance. Footnotes in the Blue Book, which go well beyond the new law itself, have further added to the uncertainty, and the very great difficulty that cities have in even getting bond council clearance on issuing any kind of general obligation bonds is compounded because of the lack of these regulations, and because of the expansion of interpretation in the footnotes.

The definitional changes on what constitutes a municipal governmental purpose, for example, the restrictions on arbitrage earning, including municipal property and income taxes in a reserve or sinking fund, the alternative minimum tax, and the rebate requirement, have all had a detrimental impact on cities' capital and debt policies. Cities have sharply reduced new tax exempt debt issuances this year just at a time when the needs are increasing.

The League did a survey on tax reform's impact on city finances. We learned that near three-fourths of all the municipalities have altered their capital and debt policies. Such changes are in a legal "twilight zone," however, awaiting regulations from the IRS.

Most of our members have had to change their debt policies to determine whether they may comply with the new 10 percent rule. While we know that not a single municipality owned and operated airport in the Nation is defined under the new law as a governmental purpose facility, we are finding an increasing number of municipal waste water treatment plants, streets, and other capital facilities which similarly fail the test.

Senator MOYNIHAN. Whose test?

Ms. KANE. The IRS's test as a result of the footnotes in the Blue Book and, therefore, the test of the bond counsel. The bond counsel has rules that they do not meet the test. For example, if a city were to build an administrative building, and put in a day care facility in that building for the employees of the city, and contract that out to a non-profit organization that was providing the day care, if that space used by the day care facility was more than 10 percent of the building, the bond counsel has interpreted the footnotes to require that that not be tax exempt, the whole building, even though it is a public building, and the day care is there for the public employees' children.

Senator MOYNIHAN. Do you have a specific for that?

Ms. KANE. I have with me Mr. Frank Shafroth of the League's staff.

Senator MOYNIHAN. Sir, would you like to come up and sit at the table. You don't have to find it in your papers, but you are obviously speaking from some experience here about what bond counsels have stated with respect to specific situation.

Mr. SHAFROTH. Perhaps the most specific we have seen so far, Senator, has been a waste water sewage treatment plant in the city of Sylvester, UT, which provides 17 percent of its waste water treatment to a U.S. Air Force Base. Under the new law, for purposes of determining whether one meets the 10 percent requirement, any non-profit entity and the Federal Government are defined as private taxpayers. Therefore, any use which exceeds that so-called 10 percent new threshold set under the new law means that you are no longer eligible to be defined as a governmental purpose.

Senator MOYNIHAN. I am on the Finance Committee. I was on the so-called Core Group that put together part of the bill, not this particular one. I was part of the Conference Committee, and I thought that we did a pretty good job. I didn't have any idea. The Blue Book that you are referring to, is that the Joint Conference Committee Report?

Mr. SHAFROTH. The Blue Book is the general explanation put out by the Joint Tax Committee last April.

Senator MOYNIHAN. I am a member of that also.

We are going to have a hearing on this. You are going to give us as many examples as you have; all right?

Mr. SHAFROTH. Yes, sir.

Senator MOYNIHAN. This is a very specific one, and a very eloquent one.

All right, will you please continue.

Ms. KANE. Another problem is the arbitrage problem in that we do anticipate that if and when the Treasury issues new arbitrage and rebate regulations, the cost of compliance will escalate significantly.

Finally, the imposition of a Federal minimum tax on all municipal governmental purpose bonds has created what one member of the House Ways and Means Committee staff called the "Chernobyl effect." It has put a cloud over all debt issuance for public infrastructure. That cloud means that we must pay higher interest costs to sell our bonds, and higher interest costs means that we get less infrastructure investment, but more local taxes.

For us it means that the Federal Government, for the first time in its history, has placed a tax on State and municipal governments.

In a related development, we note the request by the Administration to subject municipal vehicles to the Federal gas excise and annual use tax. This request, which is incorporated in the Joint Tax Committee package for the Finance and the Ways and Means Committees would constitute a direct tax on essential municipal activity.

We would very much hope, Mr. Chairman, given your profound scholarship and leadership on federalism issues, that you could take a lead in opposing this request to have the cities and States pay tax on gas that they buy and the excise and use tax.

Senator MOYNIHAN. Yes.

Ms. KANE. We support efforts to revise those portions of the tax law which most undercut the concepts of reciprocal immunity, including eliminating both footnote 160 and footnote 173 from the Blue Book.

I do want to mention, as other witnesses have spoken of infrastructure in terms of roads, sewers, airports, that from the cities' point of view, low income and public housing is also a very, very important part of the infrastructure. Since the end of World War II there has been extraordinary Federal investment in low income and public housing, but in the past seven years there has been deeper disinvestment in low and moderate income housing than in any other major domestic program. The 1986 tax bill makes significant changes which reduce the incentives for capital investment in rental housing, even private sector rental housing.

We believe that we are on the edge of a precipice. The pipeline of housing will begin to run out in the next 2 years, and this is a time bomb as we face the loss of more than 3.5 million units of low income housing stock.

Senator MOYNIHAN. How do you calculate that? Do they wear out, use up?

Mr. SHAFROTH. Most of these, Senator, there are two ways. Most of these are done under existing section 8 contracts, which vary from 5 to 20 years. There have been no new contracts authorized under the current administration. So the contracts that were already outstanding, or the ones in the pipeline, if those contracts expire, the owner or the landlord no longer carries any obligation to make those units available at less than whatever the going rate is.

The other program is an older program that no longer exists. It was a rental subsidy program. That program contains a provision that is under discussion in the Housing Reauthorization Conference right now, and it allows an owner to prepay the mortgage after 20 years. Most of the 20-year time frames will occur this year and next year, and in 1990. There are about 350,000 of those units.

Senator MOYNIHAN. Would you be kind enough to give us a little piece of paper on that one?

Mr. SHAFROTH. Yes, sir.

Ms. KANE. The final issue that we want to address is the issue of mandates. As Federal assistance for public infrastructure has declined, mandated municipal expenditures have increased, and these adversely impact, obviously, the nation's infrastructure by artificially directing capital investment.

The Clean Water Act is an example. It phases out Federal investment, but it is going to require according to EPA's own estimate, $75 billion in expenditure by municipalities to comply with the regulations and the Federal requirements over the next 10 years. Combined with the tax law changes, it is unclear where cities are going to find this extra $75 billion. We believe that if the Federal Government is going to mandate public capital investment, it ought to ensure the provision of resources to meet such requirements.

Our final item is one that previous witnesses have touched on, and that is to see that the trust funds that were specifically created by Congress for public infrastructure investment are fully utilized. There is $15 billion currently available in the Highway and Aviation Trust Funds that continues to accumulate as critical infrastructure needs go unmet, and the resulting surpluses are being used to offset the Federal deficit.

The League believes that this is an unjustified and unacceptable violation of the user fee concept of funding, which suggests that we should charge user fees, and then being blocked from spending it.

The National League of Cities believes that the National Transportation Trust Funds should be removed from the unified budget and decisions on appropriate level of funding ought to be made for transportation and not overall Federal revenue reasons.

Thank you very much, Senator, I will be happy to answer any questions you have.

Senator MOYNIHAN. We thank you very much.

One thing is clear, we are going to have a session on bonding and the Tax Code. We are going to devote a morning to it.

I have been hearing about the bond market collapse. I have to tell you that these things don't mean very much to me, I don't own any bonds, I never have, and I, obviously, never will. But I know that the bond market collapsed, it is because of the regulations and the bond counsel saying, no, you can't do that.

Ms. KANE. Right.

Senator MOYNIHAN. The whole structure turns on the bond counsel giving authority.

A couple of very real things. I want to find out about that housing, that is really very serious. You really are going to give us that information and you are going to give us some specifics.

Ms. **Kane**. We will give you some specific examples, yes, sir.

Senator **Moynihan**. You are going to give us some specifics also on the Federal Government being a private enterprise, and people acting as if it were a private enterprise.

We hear all day, not from you, but this country is going to have to sort itself out on the issue. We just can't have people lead these fund raising events devoted to the proposition that the Federal Government must get out of the government business altogether, and then make their way to a hearing where they deplore the lack of Federal activity. At some level these people are not above listening to what they do and what they say, when it produces obvious dissonance.

Revenue sharing is gone. I wrote the presidential message, which called for revenue sharing, which message led finally to the program, and this was in 1969. At the same time, we proposed that the Federal Government would assume all cost of income maintenance. At that time, we had a pattern of Federal revenues that still seemed to run ahead of Federal outlays. The Congress had not really been enacting a lot of legislation, and you had fiscal drag.

It seems to me that the tax structure is tending to bring revenues to parts of the system, and that is tending to bring activity that didn't belong there.

In one demented moment Lyndon Johnson had sent up a bill calling for Federal aid for rat control or rodent control. The real secret behind it was the Public Health Service was worried about bubonic plague making its way back from Vietnam. A couple of wiseacres over in the House got into a dialogue and said, "This is a rat fund bill." The next thing you know, Lyndon Johnson was going on about babies being bitten by rats, and this became a big issue, and they passed the bill.

The original, primal mission of municipal service is killing rats. The noble urban rat was born and died in the basement. Did you notice that you never see any dead rats on the streets?

Ms. **Kane**. Right.

Senator **Moynihan**. Rats don't cross streets.

Ms. **Kane**. They stay in the alleys.

Senator **Moynihan**. They stay in the alleys, yes. It is an elementary municipal problem, and here is the Federal Government about to do something about it, a grant-in-aid program, to get the resources down to the municipal governments, and they would take care of their rodents.

As a matter of doctrine, revenue sharing, that policy was abolished. That program was abolished in this decade as a doctrinal matter, we shouldn't be doing it, and you are not going to see it again.

It is hard to believe that people would deliberately create a crisis in the political economy. You will not see revenue sharing in any form, or shape for the rest of this century, but it doesn't mean that we have to have the tax policy make it impossible——

Ms. **Kane**. It puts the cities in a double bind to say that we will not give you revenue sharing, you have to do it yourself, and then have restrictions in the tax code that make it almost impossible to do it yourself.

Senator MOYNIHAN [continuing]. On the low income housing, I had not thought about it in that way. The next three or four decades will be usefully occupied trying to clean up the mess that we created in this one. One of the ways, I think, is to try to think of some purpose about this whole infrastructure question.

We very much appreciate your testimony. You have some information about the 60 percent expecting to double, and the 24 percent expecting to triple funding, that is a report you have somewhere; is that right?

Ms. KANE. Yes. It is a survey.

Senator MOYNIHAN. Can you send us a copy? [1]

Ms. KANE. Yes.

Senator MOYNIHAN. For the rest, I paid great attention. I see the issue of subjecting municipal vehicles to the Federal gas, excise, and annual use tax, and I will see that it doesn't happen on the Finance Committee.

Ms. KANE. Thank you.

Senator MOYNIHAN. If I can't persuade my colleagues, you can.

Ms. KANE. We will work together on it.

Senator MOYNIHAN. We will work together on that. We will proceed directly to serious hearings on financing.

We thank you very much.

Ms. KANE. Thank you, Senator.

Senator MOYNIHAN. Mr. Georgine is ill and not able to appear. We have his testimony, which will be entered in the record.

Finally, the record will remain open for 30 days to allow questions and other information to be included.

The hearing is now concluded.

[Whereupon, at 12:25 p.m., the hearing was adjourned to reconvene at the call of the Chair.]

[Statements submitted for the record and responses to additional questions follow:]

REBUILD · AMERICA

A•COALITION•FOR•QUALITY•INFRASTRUCTURE•INVESTMENT

STATEMENT BY

JOHN HORSLEY, CHAIR

REBUILD AMERICA COALITION

BEFORE THE

SUBCOMMITTEE ON WATER RESOURCES, TRANSPORTATION,

AND INFRASTRUCTURE

SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE

OCTOBER 6, 1987

WASHINGTON, D.C.

American Consulting Engineers Council • American Institute of Architects • American Public Works Association • American Society of Civil Engineers • Associated General Contractors of America • National Association of Counties • National Association of Home Builders • National Conference of State Legislatures • National Governors Association • National League of Cities • Public Securities Association • U.S. Conference of Mayors.

John Horsley, Chair, 440 First Street, N.W., 8th Floor
Washington, D.C. 20001 (202) 393-6226

MR. CHAIRMAN, MY NAME IS JOHN HORSLEY. I AM THE CHAIRMAN OF THE REBUILD AMERICAN COALITION AND THE IMMEDIATE PAST PRESIDENT OF THE NATIONAL ASSOCIATION OF COUNTIES (NACo). I APPRECIATE BEING INVITED HERE TODAY TO TESTIFY ON BEHALF OF THE REBUILD AMERICA COALITION.

FIRST, LET ME COMMEND THE CHAIRMAN AND MEMBERS OF THIS SUBCOMMITTEE FOR WHAT THEY HAVE DONE TO KEEP THE FEDERAL GOVERNMENT INVOLVED IN INFRASTRUCTURE. THIS HAS BEEN A BIG YEAR FOR THE ENVIRONMENT AND PUBLIC WORKS COMMITTEE. YOU ENACTED THE CLEAN WATER ACT OVER A PRESIDENTIAL VETO AND FOLLOWED THAT UP BY REAUTHORIZING THE FEDERAL HIGHWAY PROGRAM, AGAIN, OVER A PRESIDENTIAL VETO. WE APPRECIATE THE FACT THAT YOU ARE MOVING NOW TO ADDRESS THE INFRASTRUCTURE ISSUE.

AMERICANS TAKE FOR GRANTED A SAFE AND RELIABLE INFRASTRUCTURE NETWORK. WE RELY UPON THIS RESOURCE EVERYDAY. IT PROVIDES US WITH MOBILITY, A CLEAN ENVIRONMENT, HEALTH AND SAFETY IN OUR HOMES AND WORKPLACES AND IS THE FOUNDATION OF OUR ECONOMY. SIGNS OF DECAY--AN OVERFLOWING SEWER, AN UNMENDED POTHOLE, A POORLY MAINTAINED BUS--ARE VIEWED OFTEN AS ISOLATED INCIDENTS. A BRIDGE COLLAPSE OR AIRLINE DELAYS ATTRACT MORE ATTENTION, BUT OFTEN NOT IN THE LONGTERM SENSE. ONLY RARELY DOES ANYONE QUESTION THE FUNDAMENTAL SOUNDNESS OF THE AMERICAN PUBLIC WORKS SYSTEM. THIS IS UNFORTUNATE, BECAUSE WE ARE FACING A CRISIS. AMERICA'S INFRASTRUCTURE NEEDS TO BE SHORED UP, COAST TO COAST, HIGHWAY TO HIGHWAY. THE CHALLENGE THAT CONFRONTS US REQUIRES MORE THAN THE REPAIR OF A FEW ROADS AND BRIDGES; IT DEMANDS A

MAJOR REINVESTMENT IN OUR INFRASTRUCTURE FOUNDATION. IN SHORT, WE MUST REBUILD AMERICA.

I COME BEFORE YOU TODAY AS A REPRESENTATIVE OF A BROAD COALITION OF PUBLIC AND PRIVATE ORGANIZATIONS CONCERNED ABOUT THE NATION'S ERODING INFRASTRUCTURE AND COMMITTED TO MEETING THE CHALLENGES OF RECONSTRUCTING OUR INFRASTRUCTURE NETWORK. REBUILD AMERICA INCLUDES THE MAYORS, GOVERNORS, CITY COUNCILMEMBERS, COUNTY OFFICIALS AND OTHER PUBLIC LEADERS RESPONSIBLE FOR THE PLANNING, FINANCING, CONSTRUCTION, AND MAINTENANCE OF THE NATION'S PUBLIC FACILITIES. THESE PUBLIC LEADERS ARE SUPPORTED BY ENGINEERS, BUILDERS, FINANCIERS, CONTRACTORS AND ARCHITECTS DEDICATED TO QUALITY, SAFETY AND COST EFFECTIVENESS. WE HAVE BEEN WORKING TOGETHER TO DEVELOP THIS COALITION OVER THE LAST YEAR. AT A SEPTEMBER 9 PRESS CONFERENCE WE ANNOUNCED ITS FORMATION. THE MEMBERS OF THE COALITION FEEL THAT THE REBUILDING OF THE NATION'S INFRASTRUCTURE IS SO IMPORTANT THAT THOSE WITH A COMMON INTEREST OUGHT TO BAND TOGETHER TO PURSUE COMMON OBJECTIVES. WE BELIEVE THAT THE CRISIS THAT WAS WITH US IN THE EARLY 1980'S IS STILL PRESENT AND WE PLAN TO FOCUS ATTENTION ON IT. THE FOUNDING MEMBERS OF THE COALITION ARE THE AMERICAN CONSULTING ENGINEERS COUNCIL, AMERICAN INSTITUTE OF ARCHITECTS, AMERICAN PUBLIC WORKS ASSOCIATION, AMERICAN SOCIETY OF CIVIL ENGINEERS, ASSOCIATED GENERAL CONTRACTORS OF AMERICA, NATIONAL ASSOCIATION OF COUNTIES, NATIONAL ASSOCIATION OF HOME BUILDERS, NATIONAL CONFERENCE OF STATE LEGISLATURES, NATIONAL GOVERNORS ASSOCIATION, NATIONAL LEAGUE OF CITIES, PUBLIC SECURITIES

ASSOCIATION, AND THE U.S. CONFERENCE OF MAYORS. MANY OF THESE ORGANIZATIONS WILL BE TESTIFYING BEFORE YOU TODAY. AS THE REPRESENTATIVES OF THE MEN AND WOMEN WHO HAVE CONSTRUCTED AMERICA'S PUBLIC WORKS, OUR COALITION IS WELL-SUITED TO ADDRESS THE INFRASTRUCTURE PROBLEM.

THE UNITED STATES HAS INVESTED HUNDREDS OF BILLIONS OF DOLLARS IN INFRASTRUCTURE. THE MONEY HAS BEEN WELL SPENT. AMERICA'S INFRASTRUCTURE HAS FOSTERED ECONOMIC GROWTH, CREATED JOBS, AND SUPPORTED AMERICAN BUSINESS IN ITS STRUGGLE TO COMPETE IN INTERNATIONAL MARKETS. EVEN MORE IMPORTANTLY, OUR INFRASTRUCTURE HAS PROTECTED THE PUBLIC HEALTH AND SAFETY. HOWEVER, AS THE NATION'S INFRASTRUCTURE ERODES, THE VALUE OF OUR PUBLIC WORKS INVESTMENT DIMINISHES, THREATENING THE GROWTH, COMPETITIVENESS AND SAFETY THAT OUR PUBLIC WORKS PROGRAMS HAVE FOSTERED.

A DECAYING INFRASTRUCTURE THREATENS SOMETHING ELSE, TOO; IT ENDANGERS OUR CONFIDENCE IN THE PUBLIC SECTOR. WE MUST PROTECT AND EXPAND AMERICA'S INFRASTRUCTURE INVESTMENT--WE MUST REBUILD AMERICA--NOT SIMPLY BECAUSE IT IS ESSENTIAL FOR OUR CONTINUED PROSPERITY AND ECONOMIC COMPETITIVENESS, BUT BECAUSE IT IS CRITICAL TO OUR CONTINUED FAITH IN GOVERNMENT. REBUILDING AMERICA ENTAILS MORE THAN LAYING BRICKS AND MORTAR; REBUILDING AMERICA MEANS MAINTAINING THE CONFIDENCE IN THE ABILITY OF GOVERNMENT TO DELIVER THE ESSENTIAL SERVICES WHICH OUR COMMUNITIES ALL REQUIRE TO GROW AND PROSPER.

THERE IS MUCH TO BE DONE. EVIDENCE OF INFRASTRUCTURE DECAY

CONTINUES TO MOUNT. HALF OF OUR NATION'S BRIDGES ARE DEFICIENT; MORE THAN TWENTY-EIGHT MILLION AMERICANS ARE NOT SERVED BY MODERN SEWAGE TREATMENT FACILITIES; MORE THAN A MILLION MILES OF HIGHWAY WILL REQUIRE RESURFACING BY THE YEAR 2000. IN ADDITION, NO ONE CAN FAIL TO NOTICE THE CONGESTION OF OUR AIRPORTS AND HIGHWAYS, NOR THE DAILY HEADLINES OF ENVIRONMENTAL DANGERS THAT THREATEN THE PUBLIC SAFETY. THESE FACTS POINT NOT TO A PROBLEM ISOLATED TO A FEW STATES OR COMMUNITIES, BUT TO A NATIONWIDE CHALLENGE. REBUILD AMERICA HAS PREPARED A STATE-BY-STATE BREAKDOWN OF INFRASTRUCTURE NEEDS WHICH DEMONSTRATES THE BREADTH OF THE PROBLEM. WE ARE ALL IN THIS TOGETHER; ANY EFFECTIVE RESPONSE WILL REQUIRE COOPERATION AND PARTNERSHIP AMONG FEDERAL, STATE AND LOCAL GOVERNMENTS.

IT MAY SEEM AN OBVIOUS POINT THAT A JOINT EFFORT IS REQUIRED, BUT IT IS A POINT WORTH EMPHASIZING, BECAUSE THE VITAL IMPORTANCE OF INFRASTRUCTURE TO THE NATION IS OFTEN UNAPPRECIATED. THINK OF THE TRANSPORTATION NETWORK. EVERY COMMUNITY IS LINKED TO POINTS ACROSS THE NATION THROUGH A MAZE OF ROADS, RAIL LINES, AND FLIGHT PATHS. INVESTING IN OUR TRANSPORTATION NETWORK WILL NOT BE WITHOUT SUBSTANTIAL COSTS. HOWEVER, THE COST ASSOCIATED WITH THE INCREASED COST OF TRANSPORTING GOODS AND SERVICES AND LOST TRAVEL TIME EXCEED THOSE OF UPGRADING OUR INFRASTRUCTURE. ECONOMICALLY, A STRONG INFRASTRUCTURE SUPPORTS AN ACTIVE AND EFFICIENT COMMERCE, ALLOWING GOODS AND PEOPLE TO MOVE RAPIDLY TO CENTERS OF BUSINESS AND TRADE. THIS IS A BENEFIT ACCRUING NOT TO A SINGLE COMMUNITY, BUT TO EVERY COMMUNITY. ECONOMIC GROWTH HAS A RIPPLE AFFECT, AND INFRASTRUCTURE PROVIDES THE FOUNDATION FOR THE NATION'S CONTINUED GROWTH AND PROSPERITY.

AS THE TRANSPORTATION EXAMPLE ILLUSTRATES, A SOUND INFRASTRUCTURE IS VITAL TO THE ENTIRE COUNTRY. BUT THERE IS ALSO A LOCAL DIMENSION. INADEQUATE INFRASTRUCTURE CAN LIMIT LOCAL GROWTH BY CONSTRAINING THE CAPACITY FOR INDUSTRIAL DEVELOPMENT OR BY DISCOURAGING NEW INDUSTRY. A DEPARTMENT OF COMMERCE SURVEY, FOR EXAMPLE, FOUND THAT ALMOST HALF OF 6,870 COMMUNITIES SURVEYED WERE LIMITED IN THEIR POTENTIAL FOR ECONOMIC GROWTH BECAUSE THEIR WASTEWATER TREATMENT SYSTEMS COULD NOT ACCOMMODATE ADDITIONAL INDUSTRIAL DEMAND.

INFRASTRUCTURE IS A NATIONAL PROBLEM AND A LOCAL PROBLEM. EFFECTIVE ANSWERS WILL REQUIRE SUPPORT FROM ALL LEVELS OF GOVERNMENT. THE INFRASTRUCTURE PROBLEM IS ALSO BROADER THAN A REPAIR JOB. IT IS A PROBLEM OF PLANNING, INNOVATION AND DEVELOPMENT. WHAT IS REQUIRED IS COOPERATION AMONG PUBLIC AND PRIVATE OFFICIALS, AMONG ENGINEERS AND FINANCIERS, ARCHITECTS AND DEVELOPERS. THIS IS WHY WE ORGANIZED THE REBUILD AMERICA COALITION. WE MUST DEVELOP A MORE ADEQUATE AND MORE MODERN INFRASTRUCTURE, SUITABLE TO ACCOMMODATE THE GROWTH OF AN INDUSTRIOUS NATION. TO ACCOMPLISH THESE OBJECTIVES, TO FACE THE CHALLENGE OF AN ERODING INFRASTRUCTURE, REBUILD AMERICA HAS FORMULATED FIVE LEGISLATIVE GOALS.

IN THE FIRST PLACE, WE CAN AFFORD NO FURTHER FUNDING REDUCTIONS IN EXISTING FEDERAL PROGRAMS THAT ADDRESS

INFRASTRUCTURE NEEDS. ALTHOUGH THE NATION MUST ADDRESS THE FEDERAL BUDGET'S IMBALANCE, WE CANNOT IGNORE THE VAST NEEDS THAT CONFRONT US. PUBLIC INVESTMENT IN INFRASTRUCTURE HAS DECREASED FROM 3.5% OF GROSS NATIONAL PRODUCT IN 1967 TO 2.7% IN THE MID-80'S. THIS DECLINE SIMPLY CANNOT CONTINUE IF THE NATION IS TO PROVIDE SAFE AND RELIABLE TRANSPORTATION, WATER AND ENVIRONMENTAL SERVICES TO ITS CITIZENS.

SECOND, WE MUST LOOK TO LIFT MANY OF THE EXISTING RESTRICTIONS ON INFRASTRUCTURE DEVELOPMENT. THE TAX REFORM ACT OF 1986 LAID A HEAVY BURDEN ON INFRASTRUCTURE FINANCE. IT REDUCED MANY PUBLIC AND PRIVATE INCENTIVES FOR INFRASTRUCTURE INVESTMENT, HINDERING THE MOST EFFICIENT MEANS OF FUNDING INFRASTRUCTURE--PRIVATE-PUBLIC PARTNERSHIPS. BONDS ISSUED TO FINANCE MANY TYPES OF INFRASTRUCTURE PROJECTS ARE CLASSIFIED AS "PRIVATE ACTIVITY" BONDS BY THE ACT. SOME OF THESE ARE NOW INELIGIBLE FOR FEDERAL TAX-EXEMPTION; MOST OF THE REMAINDER ARE SUBJECT TO A SEVERE RESTRICTION ON FINANCING VOLUME. IN ADDITION, THE EXTENSION OF THE MINIMUM TAX TO MANY CLASSES OF MUNICIPAL BONDS HAS RAISED THE COST OF INFRASTRUCTURE PROJECTS BY REQUIRING STATE AND LOCAL BOND ISSUERS TO PAY HIGH INTEREST RATES. TAKEN TOGETHER, THE PROVISIONS OF THE TAX REFORM ACT OF 1986 SEVERELY RESTRICT THE USE OF TAX-EXEMPT FINANCE FOR INFRASTRUCTURE AND STRAIN THE BUDGETS OF THE STATES AND LOCALITIES THAT MUST ADDRESS THE INFRASTRUCTURE PROBLEM. ACCORDING TO THE SEPTEMBER 1, 1987 BOND BUYER, SALE OF MUNICIPAL BONDS FOR INFRASTRUCTURE PURPOSES, EXCLUDING REFINANCINGS;

DROPPED FROM $65 BILLION IN THE PERIOD JANUARY 1 - AUGUST 31, 1986 TO $35 BILLION IN THE SAME PERIOD IN 1987. THIS DROP REPRESENTS $30 BILLION WHICH WILL NOT BE SPENT ON NEEDED INFRASTRUCTURE. IF WE ARE TO MAKE A SERIOUS EFFORT TO MEET OUR INFRASTRUCTURE NEEDS, WE MUST LIFT A NUMBER OF THESE TAX RESTRICTIONS.

THIRD, WE MUST DO MORE THAN PROTECT THE STATUS-QUO. NEW INITIATIVES ARE REQUIRED. A FEDERAL CAPITAL INFRASTRUCTURE PROGRAM SHOULD BE CREATED TO PROVIDE ASSISTANCE TO STATE AND LOCALITIES IN MEETING INFRASTRUCTURE NEEDS. WE HOPE MEMBERS OF THIS SUBCOMMITTEE WILL WORK TO DEVELOP SUCH A PROGRAM AND I CERTAINLY PLEDGE THAT OUR COALITION WILL COOPERATE.

FOURTH, EXISTING FEDERAL INFRASTRUCTURE TRUST FUNDS MUST BE CONTINUED, ADEQUATELY FUNDED, AND FULLY EXPENDED FOR THEIR INTENDED PURPOSE. EVEN THOUGH THESE TRUST FUNDS ARE SUPPORTED THROUGH USER FEES DESIGNED TO PROVIDE A DIRECT LINK BETWEEN THE TAXES PAID AND THE BENEFITS DERIVED, THIS LINK HAS BEEN BREACHED OVER THE PAST SEVERAL YEARS AS OVERALL BUDGETARY CONSIDERATIONS HAVE REDUCED THE INTENDED FUNDING FOR THESE TRUST FUNDED PROGRAMS. THE RESULT IS THAT TREMENDOUS NEEDS REMAIN UNMET AND AT THE SAME TIME TRUST FUND BALANCES HAVE INCREASED DRAMATICALLY.

A GOOD EXAMPLE IS THE FEDERAL AIRPORT IMPROVEMENT PROGRAM. IN THE FACE OF MOUNTING AIRPORT CONGESTION, THE AVIATION TRUST FUND, SUPPORTED BY AN 8 PERCENT TICKET TAX AND OTHER USER FEES, HAS ACCUMULATED A $5.7 BILLION UNCOMMITED BALANCE. THESE MONIES NEED TO BE SPENT ON AIRPORT AND AIRWAY DEVELOPMENT PROJECTS, JUST

AS THE NEARLY $10 BILLION BALANCE IN THE HIGHWAY TRUST FUND NEEDS TO BE SPENT ON NEEDED HIGHWAY AND BRIDGE IMPROVEMENTS.

FINALLY, A FEDERAL, LONG-TERM CAPITAL BUDGET SHOULD BE ESTABLISHED. THE CURRENT MIXTURE OF CAPITAL AND OPERATING EXPENDITURES CONFUSES NATIONAL PRIORITIES. LIKE ANY GOOD BUSINESS AND LIKE MOST OTHER LEVELS OF GOVERNMENT, THE FEDERAL GOVERNMENT SHOULD ACCOUNT SEPARATELY FOR ITS CAPITAL AND OPERATING EXPENSES.

THESE STEPS ARE NECESSARY IF WE ARE TO ADDRESS OUR INFRASTRUCTURE PROBLEM. THE MEMBER ORGANIZATIONS OF REBUILD AMERICA WILL GLADLY COOPERATE WITH ANY FEDERAL INITIATIVE TO FUND INFRASTRUCTURE DEVELOPMENT. WE PLEDGE TO DO OUR PART IN MEETING THE INFRASTRUCTURE CHALLENGE.

IF I MAY, LET ME PUT ON MY NACo HAT FOR A MOMENT. COUNTIES ARE VERY INVOLVED IN INFRASTRUCTURE AND THE DEMANDS TO BECOME EVEN MORE SO WILL INCREASE AS THE SUBURBANIZATION OF AMERICA MOVES AHEAD. NACo RECENTLY COMPLETED AN INFRASTRUCTURE REPORT, PREPARED BY APOGEE RESEARCH, ENTITLED AMERICA'S COUNTIES: PUBLIC WORKS LEADERS. ALL MEMBERS OF THE COMMITTEE HAVE BEEN SENT A COPY AND I WOULD LIKE TO REQUEST THAT IT BE MADE PART OF THE RECORD. THE REPORT FOUND THAT COUNTIES OWN 40 PERCENT OF AMERICA'S ROADS, OWN AND OPERATE 34 PERCENT OF THE PUBLIC AIRPORTS, 23 PERCENT OF LOCAL PUBLIC TRANSIT SYSTEMS, AND PROVIDE WASTEWATER TREATMENT FOR MORE THAN 30 MILLION AMERICANS, AND ARE RESPONSIBLE FOR ALMOST 40 PERCENT OF THOSE LANDFILLS OWNED AND OPERATED BY LOCAL GOVERNMENT. EXCEPT, PERHAPS, IN THE AIRPORT PROGRAM, RECENT FEDERAL ACTIONS ARE NOT GOING TO MAKE THE

OPERATION AND EXPANSION OF COUNTY INFRASTRUCTURE ANY EASIER. INDEED, COUNTIES ALREADY SPEND $10 BILLION ANNUALLY ON INFRASTRUCTURE. THE NACo REPORT DOCUMENTS THAT COUNTIES NEEDS WILL REQUIRE $18 BILLION ANNUALLY THROUGH 1990. THAT LEAVES AN ANNUAL GAP OF $8 BILLION OR 47 PERCENT OF THE TOTAL NEEDS BETWEEN 1986-1990 THAT WILL NOT BE MET WITH EXISTING LEVELS OF FUNDING. THIS GAP IS LARGE AND NEEDS THE FEDERAL,STATE, AND COUNTY GOVERNMENTS CREATIVE THINKING TO ADDRESS IT. WE ALSO NEED THE EXPERTS IN THE PRIVATE SECTOR TO WORK WITH US. THAT IS WHY THE COUNTIES HAVE JOINED THE REBUILD AMERICA COALITION

ON BEHALF OF REBUILD AMERICA, I THANK YOU FOR THE OPPORTUNITY TO ADDRESS THE COMMITTEE THIS MORNING.

NATIONAL ASSOCIATION *of* COUNTIES

440 First St. NW, Washington, DC 20001
202/393-6226

November 10, 1987

The Honorable Quentin Burdick
Committee on Environment and Public Works
458 Dirksen Office Building
Washington, D.C. 20510

Dear Senator Burdick;

I am responding to the five questions posed to me in your letter of October 9.

1. In consultation with State and Local Governments, Congress should develop a National Public Works Investment Strategy which sets forth a coordinated plan of action regarding steps to be taken at each level of government, federal, state and local, to increase net infrastructure investment over a multi-year period. This concept was supported by the U.S. Senate Private Sector Advisory Panel on Infrastructure Financing on which I served. It stated:

> " Finally, the lack of a comprehensive national infrastructure policy has resulted in legislation that will severely constrain the capacity of local governments to finance their own infrastructure needs. The recently enacted Tax Reform Act limits the access of state and local governments to the municipal tax-exempt bond market and drives up the cost of state and local borrowing for public works investment. At a time when more federal financing requirements, especially for environmental control facilities, are being required of state and local governments, this has the appearance of a policy at cross purposes.
>
> A national investment strategy for public works should be defined. The policy should identify the areas of continuing federal commitment to infrastructure financing, new and emerging areas where federal contribution may be required, and areas where state, local and private initiatives should be encouraged. Moreover, the policy

should identify the areas of continuing federal commitment to infrastructure financing, new and emerging areas where federal contribution may be required, and areas where state, local and private initiatives should be encouraged. Moreover, the policy should define the ways and the means for sustaining federal commitments. Federal laws and regulations that limit or constrain state and local capability should be systematically examined and revised."

My specific recommendation is that the Senate and House Public Works Committees sponsor a Resolution convening a "National Public Works Investment Policy Conference". This conference, convened in the Spring of 1988, would include the participation of key leaders in the public works field from Congress, the Administration, States, Cities and Counties. Our Rebuild America Coalition would be happy to discuss this concept further with your staff to see if its implementation is feasible.

2. Privatization has been useful in a number of areas. Financial partnerships with the private sector through the use of municipal bonding and leasing has made it possible for many county governments to finance and build very expensive parts of their infrastructure, such as solid waste disposal facilities. Without the private sector participation, these resources recovery facilities, trash-to-steam plants, etc. would not have been constructed. It is clear to me that the 1986 tax bill will make public-private sector cooperation much more difficult to the detriment of our infrastructure.

3. I think there will have to be a recognition that some assistance to meet these off-system needs will have to come from state and federal governments. It is clear to me that much of the rural heartland of the U.S. has been devastated by the current farm crisis and a loss of federal revenue sharing and those small communities will need assistance from outside sources. A broadening of the eligibility of the federal-aid highway program or a new off-system road category are approaches which should be considered. Another approach would be a program of targeted fiscal assistance which would include local roads as an eligible activity.

4. I view the local highway and bridges as major participants in the Post-Interstate Era. The local system and the FAUS and FAS systems have waited patiently as much of the federal trust fund dollars have gone into the Interstate program. These systems did not even benefit from the 5 cent increase in 1982. It is time to recognize that the condition of the farm-to-market system, the increasing problem of urban congestion, and the migration to the suburbs are issues that are of national concern and may appropriately be addressed by the federal-aid highway program.

5. We have spent over a year in developing the Rebuild America Coalition. While time consuming, the coalition members have stayed together because they view this as such an important issue. We are encouraged by our success and plan to seek additional members to broaden our coalition. It pleases me that the private and public sector, which for so long had different agendas, have been able to come together and remain united.

Please feel free to contact me or Bob Fogel of the NACo staff if you have any questions concerning my responses to your questions.

Sincerely,

John Horsley

John Horsley
Chair
Rebuild America

BF/ab

1. What do you think is the single most effective and feasible action Congress could take to strengthen the infrastructure of our nation?

2. How useful do you think various forms of privatization are to states and localities as they seek to meet their infrastructure needs?

3. How can rural communities with small populations and weak tax bases meet their off-system road needs?

4. As you know, the interstate highway system will finally be completed in 1991. What do you see as the major national interest in highways in the post-interstate era?

5. The Rebuild America group and other infrastructure coalitions are attempting to work together in developing recommendations. In the past, competing interest groups have found that very difficult. What encouraging, or discouraging, signs do you see for this kind of consensus building?

NATIONAL COUNCIL ON PUBLIC WORKS IMPROVEMENT

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Freeman Holmer

Lowell Jackson

Frieda K. Wallison

Executive Director
Nancy S. Rutledge

TESTIMONY TO THE SUBCOMMITTEE ON WATER RESOURCES,

TRANSPORTATION, AND INFRASTRUCTURE

SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

Nancy S. Rutledge, Executive Director
National Council on Public Works Improvement

October 6, 1987

Introduction

Good morning, Mr. Chairman and Members of the Committee. I am Nancy Rutledge, Executive Director of the National Council on Public Works Improvement. Thank you for this opportunity to testify.

In the past 18 months, the National Council on Public Works Improvement (the Council) has carried out a broad-ranging research and public outreach program to meet the mandates and the spirit of Public Law 98-501. This effort included publication of two interim reports, a series of public hearings, and numerous critics' sessions. The Council is now working on the last major element of its workplan -- its final report to the President and the Congress.

The key findings and recommendations of the final report are still undergoing vigorous discussion among Council members. The central purpose of this testimony is to review the scope of the Council's work to date and to outline some of the major issues and policy options at stake in these discussions.

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Review of the Council's Initial Reports and Research

The Council was created by the Congress (Public Law 98-501) in October 1984 to provide an objective and comprehensive overview of the state of the nation's infrastructure. The Council was given a short lead-time to report on a wide range of issues, including:

- the age and condition of public works;
- finance methods and trends;
- the capacity of public works to sustain our economy;
- maintenance needs; and
- the development of appropriate criteria for conducting needs assessments at all levels of government.

The enabling legislation also established a twelve-member advisory group to assist the Council. This body is chaired by the Secretary of the Army and includes the Secretaries of Commerce, Agriculture, Transportation, and Housing and Urban Development, the Administrator of the Environmental Protection Agency, and the elected heads of the National Governors' Association, the National Association of Counties, the National Association of Regional Councils, the National Conference of State Legislatures, the U.S. Conference of Mayors, and the National League of Cities.

At the outset of this project, the Council determined that it would not undertake another physical inventory of the nation's infrastructure "needs." This decision was based on the conviction that the inventory approach was impractical in view of the limited time and resources available to the Council. Also, a needs inventory would have very little "value-added" in terms of substantive policy guidance and support to the Congress.

Several other national needs studies are already in the public record -- namely, those completed by the Joint Economic Committee of the Congress, the Congressional Budget Office, and the Associated General Contractors. Collectively, these studies offer a reasonably complete view of available information on existing facilities.

The Council determined that assessing infrastructure needs is more than counting and measuring the condition of existing facilities against various technical standards. To the public, the physical infrastructure represents a set of services, such as reliable transport of goods and people, fresh water, protection from floods, and safe disposal of wastes. These are all basic components that determine the nation's quality of life and its economic vitality.

Government has the responsibility to provide these services in a safe and reliable manner, but that responsibility does not necessarily bind it to the preservation of all current facilities or to conventional methods of construction and operation. Long-term alternatives may involve new technologies, new or improved forms of management, better training and professional staff development, more aggressive maintenance, land-use planning, joint development with the private sector, or cooperative regional provision of services. These practices obviously offer no "quick-fixes," but they represent some of the many alternatives and opportunities absent in most needs assessments or crisis-oriented news stories.

The Council's first report, released in September 1986, explored the definition of needs and provided a brief review of key issues and the Council's continuing research agenda. These issues included:

- importance of infrastructure to the economy;
- techniques for improving management and decision-making practices;
- potential for technological innovation;
- realignment of federal, state and local roles; and
- public works finance and expenditure trends.

The second report was issued as a nine-volume set, evaluating the following major categories of public works:

- highways, streets, roads and bridges;
- mass transit;
- airports and airways;
- intermodal transportation;
- water resources (including ports, canals, dams, irrigation);
- wastewater treatment;
- water supply;
- hazardous wastes; and
- solid wastes.

Each volume was produced by an independent contractor who is recognized as an expert in the respective category. Each contractor had a standardized outline of issues to cover and a broad-based working group of technical specialists and staff members from both the executive branch and the Congress to review and comment on the work at crucial phases. The contractors were not required to achieve working group consensus on all issues, but rather to take full account of different perspectives and to provide an accurate and balanced report.

In the final recommendations chapter of each report, the contractors were asked to provide the Council with their best judgment on which issues and reforms would make the greatest improvement. As indicated on the cover of each report, these recommendations do not necessarily represent the opinions or positions of the members of the Council nor the working groups. However, these materials have formed a significant basis for ongoing Council deliberations.

Some of the themes that emerged from all nine reports are as follows:

- America is not "in ruins"; in fact, many of the nation's infrastructure systems work fairly well. However, the system as a whole appears to be just barely adequate to meet current needs. Many argue that the nation needs a sustained period of reinvestment to provide an infrastructure that will support future needs and a competitive economy. Of course, the evaluation of individual modes varies considerably, with aviation and water supply functioning reasonably well (despite severe peaking problems in air travel) and mass transit and hazardous waste in need of greatest improvement. There is also considerable geographic variation. Many rural areas and small communities appear to have serious problems meeting needs in virtually all categories.

- Every report except solid waste (which is generally locally- or privately-funded) mentioned the need to redefine and focus government roles in order to tighten accountability, increase efficiency, and allow for timely decisions and implementation. In general, most changes called for shifts in responsibility away from federal agencies and toward state and local bodies. This effort emphasizes the level of government that directly provides most infrastructure services. Only in certain aspects of environmental regulation and hazardous waste management were proposals made to strengthen or expand federal programs. The solid waste study, for example, called for broad federal programs to encourage waste reduction. The hazardous waste study recommended reducing the uncertainty of federal regulatory and enforcement programs.

- Financing options which emerged from these studies generally pointed to a basic goal -- to make more efficient use of existing facilities as a partial substitute for major expansions in capital funds. Options here include: full-cost pricing in rate setting for water supply, wastewater treatment, and solid waste; low-capital solutions to encourage better use of existing facilities; public/private partnerships; and various changes in the federal financial role.

- The potential for payoffs from improved technology and technical assistance for state and local government was emphasized by all of the environmental studies. The payoffs from research into new techniques or technologies were seen to be strongest in solid waste, water supply, and wastewater treatment. Within water supply, research needs focused on how best to meet the new drinking water purity standards, training operators, and providing technical assistance to small systems. Hazardous waste emphasized ways to reduce the private risk of developing new treatment techniques.

The Council has also commissioned a series of research papers and working groups on cross-cutting issues that affect all categories of public works. The six major study areas include:

- **public works and the economy** -- relationship between public works and the level, growth, and structure of business and economic activity; and measures of infrastructure adequacy and performance;
- **international comparisons** -- how other nations use public works for economic development and competitiveness;
- **performance** -- definition and development of comprehensive performance measures for public works;
- **technology and innovation** -- development of a national public works research agenda, along with appropriate institutional and human resources to finance and implement this program and to disseminate new knowledge;
- **intergovernmental issues** -- structure of federal, state, and local decision making; the role of special districts and authorities in providing public works, innovative public works practices; state aid for local public works projects; and the particular problems of small public works systems; and
- **finance** -- alternative debt and revenue sources for financing public works, particularly in the light of the Tax Reform Act of 1986.

The highlights of this material, along with relevant portions of previous research and testimony provided at Council hearings, will be compiled and published in the form of a major source book, accompanying the Council's final policy recommendations.

Major Policy Considerations of the Council's Final Report

The Council's central focus during the past 18 months was to guide the development of a complete compendia of public works research. Members of the Council concluded at the outset of this effort that they were also obliged to add a formal collective judgment about the key elements of a constructive national agenda on infrastructure.

At the Council's regional field hearing in Boston this past month, Michael Deland, Regional Administrator for the U.S. Environmental Protection Agency, testified: "Where in the myriad of problems is the good news? I would like to suggest that it lies in the opportunity to get government moving before an infrastructure crisis is upon us."

Such a task is extraordinarily difficult within the short time frame available to the Council. It also flies directly in the face of the nation's broad diversity of views on the subject of infrastructure improvement -- especially among those most directly involved.

Nevertheless, the Council is attempting to draw together a consensus on the following critical questions:

(1) **What level of national public works spending is appropriate and necessary?**

Although the Council did not undertake a definitive needs estimate, it has gathered substantial evidence that demand for vital public works services is increasing faster than underlying physical capacity. In short, we are living off past investments. Yet, all levels of government are facing serious fiscal constraints -- in particular those imposed by the federal budget deficit.

One approach to this question would call for a significant increase in capital spending for public works (apportioned among all levels of government) as a necessary and achievable objective for the nation as a whole. Whatever the order of magnitude for future funding suggested, it would not be proposed as a definitive target for each level of government or type of public works, but as a broader call-to-arms for increased effort and for more effective use of existing resources.

(2) **How should public works be financed?**

Some of the basic strategies under consideration here include:

- increased reliance on the beneficiary-pays principle to finance public works at all levels of government;
- promote developer financing of new infrastructure investments;
- spend federal public works trust funds at the rate at which revenues are collected;
- enhance the role of state aid for local public works; and
- review the impact of the 1986 Tax Reform Act in terms of capital formation and the availability of capital for state and local public works projects.

(3) **How can limited resources be used more efficiently?**

Even the most optimistic scenario for increased funding will fall short of current perceptions of need. The Council is considering a number of proposals to improve efficiency and accountability, including:

- **comprehensive capital budgeting** at all levels of government which helps to generate comparative economic analyses of investment proposals -- including new construction, rehabilitation, operations, and maintenance.

  This proposal is not focused on enactment of a separate capital budget, but rather it emphasizes the evaluation process and making more reasoned choices among alternative investment proposals.

- **stretching capacity of existing facilities** by improving maintenance procedures, substituting low-capital options for capacity expansion (such as water consumption regulators or freeway ramp metering), promoting regionalization and managing growing demand for public works (such as more aggressive recycling efforts and waste-end taxes).

  Improving incentives for maintenance appears to have significant potential for stretching capacity. Establishment of sinking funds or depreciation reserves could provide strong incentives to extend the life of physical assets. These funds could be supported with annual payments by the owner of the facility. Such sinking funds might be required as a condition for federal grants. Alternatively, they could be optional, with federal "overmatches" provided to encourage their use.

o consolidating or decommissioning underused and obsolete infrastructure.

(4) How can public works performance be measured more effectively?

"Performance" as used here is measured by the quantity, quality, and cost effectiveness of public works services delivered. Currently, performance measures are poorly developed, inconsistent across jurisdictions and categories of public works, and rarely used to evaluate expenditure options.

One proposal would encourage the federal government to provide leadership and start-up financing to set up national performance measures that could aid state and local decision makers in setting infrastructure priorities.

(5) How should government roles and responsibilities be sorted out or changed?

Government roles in infrastructure finance reflect historical forces and need to be re-examined periodically and better aligned with effective responsibilities. Council research to date has suggested an expanded federal role in research, a re-examination of the federal role in the regulatory area, and more involvement of the private sector in some public works categories.

Specific recommendations from researchers which the Council is considering include:

o turn-back of the non-interstate Federal aid highway systems to state and local government; and

o converting federal mass transit assistance into a non-restrictive block grant program.

(6) **How can the development and implementation of public works innovations be accelerated?**

One proposal would recommend a national program of priority research, development, demonstration and information transfer to fill the major gaps in current R&D efforts and address high-payoff areas for public works innovation. The National Research Council might be a logical body to coordinate this effort.

In addition, university-based institutions could serve as regional centers of public works innovation, with field demonstrations of the applicability of research and development efforts.

Our research effort over the past 18 months yields no simple or easy answers to these or any other questions. Nevertheless, we believe that it will serve as a significant resource for continuing Council deliberations and for future Congressional policy-making on this important issue.

Mr. Chairman and members of the Subcommittee, I invite you to follow our work closely and to give us your comments as the Council moves toward its findings to support a national commitment for infrastructure renewal and growth. I will be happy to provide any information and support which may be helpful to members and staff.

Thank you.

NATIONAL COUNCIL ON PUBLIC WORKS IMPROVEMENT

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Nancy S. Rutledge

November 6, 1987

The Honorable Quentin N. Burdick
Chairman
Senate Committee on Environment and Public Works
Dirksen Senate Office Building
Room 140
Washington, D.C. 20510-6025

Dear Senator Burdick:

Thank you for the opportunity to testify before the Subcommittee on Water Resources, Transportation, and Infrastructure. We appreciate your continued interest in the National Council on Public Works Improvement and its activities.

Enclosed are the answers to the eight questions contained in your letter of October 9, 1987. If you want additional information on these or any other questions please let me know. We have done some interesting research over the last 16 months which is relevant to many of the policy issues currently being debated in the Congress. We are eager to share that information with all interested parties.

Sincerely,

Nancy Rutledge

Nancy Rutledge
Executive Director

NR/ljh

1111 18th Street, N.W. Suite 716, Washington D.C. 20036 (202) 653-0298

Question 1:

What do you think is the single most effective and feasible action Congress could take to strengthen the infrastructure of our nation?

Answer:

To encourage additional spending on public works by all levels of government, the most important thing for Congress to do is take immediate steps to achieve a better balance between current consumption and investing for the future. A major step in that direction would be to move aggressively to reduce the federal budget deficit. Such action could reverse the nation's declining commitment to the future illustrated by:

- a decline over the last decade in the share of Gross National Product devoted to business and personal saving declined from 19.0 percent to 17.5 percent.
- an increasing share of savings being devoted to satisfying government borrowing needs, mostly -- though not entirely -- those of the federal government. Between 1975 and 1985, the share of new individual savings used to purchase government securities rose from 11.5 percent to 31.5 percent. Federal borrowing needs absorb savings without generating a corresponding increase in investment.
- the increasing U.S. international trade deficit which has more than doubled between 1985 and 1986 alone and which reflects our high consumption and low savings.

Council research indicates that public works investment increases productivity and supports business expansion and employment growth. Improved productivity, in turn, may help reduce the U.S. international trade deficit. However, spending on public works facilities is declining as a share of government spending, as a share of GNP, and in relation to private-sector capital spending. Per capita public works spending however, has been increasing.

Council research indicates emerging infrastructure stresses, signaled by road congestion, bridge disasters, hazardous waste problems, questions about air safety, airport congestion, and drinking water quality. In order to relieve these stresses, the nation must use existing facilities more effectively and invest more in public works capacity. Greater public works investment by all levels of government is needed to increase the nation's productivity, to support business expansion, to spur employment growth and to help reduce the U.S. international trade deficit. The Federal government cannot be a reliable infrastructure partner until its deficit is brought under control.

Question 2:

I understand that the Council is preparing a special report on the infrastructure needs of small communities and small systems. When will that report be available?

Answer:

One of the main themes to emerge from the Council's in-depth study of nine categories of public works was that small systems have unique problems and that they often are acknowledged, but generally ignored. As a result of those categorical studies, the Council commissioned a study to look at the unique problems of small systems and to propose, for Council consideration, alternative solutions to those problems. That report was completed in late September and a copy is attached.

NOTE--The report referred to above has been retained in committee files.

Question 3:

"Do you think that performance measures might lead to better public works decision-making than the more traditional "needs" inventories?"

Answer:

Yes. One of the major themes to emerge from the Council's research is that performance measures would encourage more informed public works decision-making in two ways. First, such measures focus decision-making directly on the adequacy of the services being delivered relative to the levels of service demanded. Second, they focus decision-making on the most cost-effective means of delivering those services.

With respect to service adequacy, the types of measures used could include ones such as:

- the percentage and types of population served;
- actual usage versus the service capacity available (or extent of reserve capacity);
- compliance of services delivered with established service standards;
- frequency of delays, overcrowding, accidents, breakdowns, or other interruptions to services; and
- economic and social benefits resulting from services delivered compared with expected benefits.

Such performance measures contrast with traditional physical asset data such as extent, value and condition of public works facilities and equipment. Although such asset data help decision-makers maintain existing facilities in accordance with engineering standards, they offer little advice about the adequacy of service delivery. They leave decision-makers in the dark about whether additional facilities are needed and whether different types of facilities would be more effective. They are of little use in setting expenditure priorities and exploring low-cost service delivery alternatives.

With respect to focusing decision-making on the cost-effectiveness of service delivery, the types of measures used could include ones such as:

- unit costs of services delivered or proposed;
- the benefits of services delivered in relation to their costs;
- the rate of facility and equipment replacement at present spending levels, in relation to their life expectancies; and

- the extent to which costs of services are being recaptured from user fees or benefit charges.

Such cost-effectiveness measures contrast with the more traditional data on current spending in relation to past spending or to present asset values. They provide decision-makers with more precise information about the relative efficiencies of alternative projects and programs in providing services. The alternatives assessed could include operating and maintenance activities as well as construction projects and new equipment purchases.

Performance measures, if available on a consistent basis nationwide or statewide, can be aggregated and summarized to assist state legislators and governors or the Congress, the President, and appropriate federal executive agency officials in developing and funding more effective intergovernmental assistance and regulatory programs in the public works field.

Question 4:

How can rural communities with small populations and dwindling tax bases best meet their infrastructure needs? If there were, for example, a turnback of the non-interstate federal-aid highway systems to state and local governments, how would the less prosperous parts of the country fare?

Answer:

This is really two questions, one of a quite general nature, and one that is very specific. Thus, two answers are required.

With respect to the general question of how smaller, less prosperous rural communities can meet their infrastructure needs, there are at least four options. All are aimed at the same dual objective -- namely, finding a way to capture economies of scale and to provide access to a larger, more diversified and prosperous tax base. The four options, which will be explained below, are:

- federal aid;
- state aid;
- state assumption of certain functions; and
- restructuring of local governments or programs.

The federal-aid option, of course, currently is in decline and may not be very fruitful, at least in the near future. The principal federal programs that have been important in the past have been the rural development programs of the Department of Agriculture, the economic development programs of the Department of Commerce, the small communities portion of the community development programs administered by the Department of Housing and Urban Development, and the Sec. 18 transit program and non-urban highway programs administered by the Department of Transportation.

The degree of reliance on the state-aid option varies widely from state to state. According to studies prepared for the Council,[1] some states have increased their public works aid in recent years while others have decreased such aid. In addition to direct aid such as grants, loans, and shared taxes, however, some states have authorized local governments to collect more user fees and have assisted localities in accessing the bond market.

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[1] Larry C. Ledebur, William Hamilton, and Roger Vaughan, Changing State Roles in Public Works (Arlington, VA: ASLAN, September 11, 1987); Terry Busson and Judith Hackett, State Assistance for Local Public Works (Lexington, KY: The Council of State Governments, August 1987).

The option of state assumption of public works functions has recent examples in Delaware, New Jersey, and Rhode Island. Alaska is a state with a long tradition of this practice. Maryland assumed responsibility for all school construction several years ago. And, in the highway field, 70 percent or more of all highway spending is done directly by the state in 13 states, and the proportion is over 90 percent in West Virginia. Michigan is now moving in this direction to offer a measure of fiscal relief to its hard-pressed localities.

Finally, the option of local restructuring offers several opportunities:

- First, consolidation of small local governments into larger ones has occurred only in rare cases when left to local option, but has occurred quite generally among small school districts with state prodding all across the nation.

- Second, most localities have authority to contract for services with other local governments. They also generally have authority to exercise their powers jointly through interlocal agreements. Both of these mechanisms allow economies of scale to be accomplished without loss of organizational autonomy. Shared personnel, joint purchasing of materials and supplies, and joint operation of public works programs can be negotiated under those state grants of authority.

- Third, a council of governments or similar regional organization may serve as the vehicle for negotiating or operating these interlocal activities that also may afford economies of scale without loss of local government autonomy.

With respect to the second question about smaller, less prosperous rural governments, how they would fare under a federal highway turnback program would depend largely upon how the program is designed. If the program were to be designed as proposed by the National Association of State Budget Officers (NASBO) it would:

- turn back to the state full responsibility for all federal-aid highways except the Interstate System;

- relinquish seven cents of the federal gasoline tax;

- assume that each state would raise its own gas tax by seven cents; and

- devote one cent of the remaining federal gas tax to an "equalizing" lane-mile grant to the states.

The only states that would be worse-off financially than at present would be Alaska ($70.5 million), the District of Columbia ($20.3 million), Hawaii ($3.6 million), New York ($16.1 million) Ohio ($5.1 million), and Rhode Island ($0.4 million).[2] Other program design options exist for adjusting the mileage of the systems to be turned back and for fine tuning the "hold harmless" mechanisms.

Of course, the principal unknowns in a turnback arrangement like this are the extent to which the states will (1) re-enact the relinquished federal tax at their own level, and (2) distribute the new funds among local governments in a manner similar to that under the former federal program. Since the concept behind turnbacks is to reduce federal control, there would be no acceptable way to allay this uncertainty.

However, if a block grant were used instead of a turnback, most programmatic responsibility could be turned back to the states without substantially altering the flow of funds or introducing the uncertainty about state reenactment of the tax.

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[2] As reported in ACIR, Devolving Selected Federal-Aid Highway Programs and Revenue Bases: A Critical Appraisal (Washington, D.C.: September 1987), p. 51.

Question 5:

Throughout the reports by the Council's consultants, there is much said about "need" and about cost estimates of how much investment in different infrastructure areas is necessary in the future. Would it be possible for the Council to prepare a summary table or chart on national infrastructure needs, by category, with some indication of how much of this need will be met in the future by current state and Federal programs?

Answer:

Enclosed are two background papers prepared for the Council by Apogee Research, Inc. The first, Needs Estimates, examines the range in needs estimates by category and discusses some of the limitations of this approach for informing policy choices. The second paper, Separating Operations from Maintenance, breaks down total government spending by category into capital, operations and maintenance components. The following table, which is extracted from these two papers, presents the range in annual needs estimates by category (from the first paper) and actual spending by all levels of government to address those (needs from the second paper).

Consolidated Annualized Capital Needs Estimates and Current Capital Spending for All Levels of Government (billions of 1984 dollars)

Category	High Estimates	Low Estimate	Capital Spending in 1984
Highway	34.1	27.9	23.0
Bridges	5.1	3.4	
Airports	2.4	1.8	2.2
Air Traffic Control	0.5	0.5	
Mass Transit	7.3	5.5	3.9
Water Resources	5.4	2.2	4.0
Wastewater	6.8	5.4	5.7
Water Supply	12.0	3.7	4.6
Solid Waste	1.2	0.6	0.6
TOTAL	74.8	51.0	44.0

Question 6:

a) **There seems to be very little in the way of state-by-state data on infrastructure "needs". Is that an accurate perception?**

b) **Take water supply needs, for example. Are there any state-based needs assessments in this area?**

Answer:

a) There are very few state-based assessments of state and local needs for infrastructure.

The most comprehensive state-by-state survey of needs was prepared by the Joint Economic Committee of Congress in the Hard Choices study completed in 1984. The study made "threshold" estimates of needs in 23 states.

Several states have also undertaken needs assessments including Washington, Oregon, Oklahoma and Michigan. These are typically comprehensive and developed from original data rather than from existing information as was the case for the Hard Choices study. These individual state studies are not comparable since the states performed them in different years, usually with different methodologies and included a different mix of infrastructure systems.

b) In the specific area of water supply, several states have undertaken studies. The most recent studies were performed in Ohio, Oregon, Pennsylvania and Virginia. No comprehensive study of need in all fifty states has been done. The general studies of infrastructure needs mentioned above also contain water supply needs. The following is a list of contacts in the states listed above in case you want more information about these recent studies.

List of State Contacts

Ohio	Mr. Stuart Bruny	614/481-7025
Oregon	Mr. Jim Boydston	503/229-6310
Pennsylvania	Mr. Fred Morrocco	717/787-9035
Virginia	Mr. Alan Hammer	804/786-1766

Question 7:

The consultant's report to the Council on water supply concluded that there was a national problem in the area of water supply infrastructure needs for small systems. Do you concur in the finding of the report?

Answer:

The Council generally concurs with the consultants finding in this area.

Approximately 51,400 (88 percent) of the nation's 58,530 community water systems are considered small. These systems serve about 24.9 million people or 11.4 percent of the population served by community water systems. Council research indicates that many of these systems operate on a marginal basis, with inadequate resources -- operational and managerial -- to correct existing deficiencies. These systems are charged with delivering safe and dependable supplies of water to consumers, even though they often face serious problems in managing, operating, and maintaining the systems properly.

Council research indicates the majority of these systems:

- have limited economies of scale and thus have high fixed costs per customer;
- have inadequate rates to support the full cost of service;
- usually serve low, fixed income populations;
- have limited access to capital markets;
- lack the expertise to utilize new technologies; and
- have no full-time, or sometimes even part time, operators.

Many feel that these factors will make it very difficult for the majority of small water systems to implement the 1986 amendments to the Safe Drinking Water Act.

Question 8:

The Council and other infrastructure groups are attempting to work together in developing recommendations. In the past, competing interest groups have found that very difficult. What encouraging, or discouraging, signs do you see for this kind of consensus building?

Answer:

While the Council is not specifically charged with building consensus, we have made an earnest and sustained effort to communicate with all groups involved in the infrastructure issue. We have found little basic disagreement on the scope and importance of the problem. Finding agreement on workable solutions and strategies, however, is much more difficult. Many of the special interests represented in Washington advocate preserving and expanding the financial role of the federal government. The Council does not discount the federal partnership role, but also recognizes that current fiscal constraints demand much more creative and broad-based approaches.

The Council's outreach effort has taken place both in and outside of Washington. Hundreds of state and local officials and business and professional leaders who deal with infrastructure every day have shared their expertise and opinions. While issues such as federal funding and tax reform are frequently mentioned, most of these individuals acknowledge that infrastructure is a much more complex and challenging problem than will ever be solved by one more grant or tax code provision.

Finding consensus among the various groups based in Washington may not be possible within the narrow time-frame of the Council. Changing formal policies and customary lobbying positions is difficult and time-consuming. However, we are confident that a broad consensus on infrastructure policy is possible on a national basis. We believe that the Council's research and public outreach effort has been an important step toward building that consensus.

NEEDS ESTIMATES

Needs estimates, almost by definition, are a simplified, macro view of the spending required to build standard types or sizes of public works structures. Most "needs studies" suffer from a number of major shortcomings that limit their usefulness as input to policy making:

- Needs for component parts within a mode or needs across modes are usually not comparable. Adding them together paints a misleading picture unless care is taken to control for the inclusion of operation or maintenance in capital estimates, the periods of time over which total estimates are made, the assumptions about economic growth and inflation built in to needs estimates, and the level of government and/or the private sector components.

- Aggregates for the entire nation obscure real surpluses and shortfalls regionally. This is a major shortcoming of national estimates in water supply.

- Needs change from year to year. The airports estimates fluctuate widely from one period to the next depending on which airports are included.

- If needs are driven by technical standards, as in wastewater treatment and bridges they neglect site-specific conditions that usually can reduce the cost of providing comparable services.

- Needs take little or no account of the provision of services; they focus only on the cost to build structures. In water resources, for example, their are usually many non-structural solutions to building a dam for flood control. Water supply needs estimates can vary tremendously depending on assumptions about consumer acceptance of water conservation.

- Some needs estimates are driven by highly subjective standards that fail to consider alternatives such as disinvestment. The bridge replacement and rehabilitation estimates assume that every bridge will receive total restoration or replacement, but many can be down-posted to handle lighter traffic or closed entirely.

- Needs are generally unconstrained by budgets. Without such constraints, there is every reason to expect a "wish list". The needs estimates for inland waterways reflect this shortcoming.

- o Needs assume no change in current policies. If funding formulas or cost sharing conventions change, the demand for public works will almost certainly diverge from prior estimates of needs. All of the major deep draft ports recently authorized scaled down their project scope and costs -- on average, by half! -- when the 1986 cost-sharing rules took effect. These required much higher local shares than under previous policies. A recent empirical analysis estimated that the shift from 75 percent to 55 percent federal wastewater treatment construction grants would result in 30 percent less expensive secondary treatment plants.

Table 1 presents a range in needs estimates by mode. The high ranges generally correspond to unconstrained needs. These do not respect budgets, price-elasticities,or declining returns on investment. The low ranges attempt to take these considerations into account. Some differ from the ones on your table, for unexplained reasons. We went back to the original needs sources for our numbers. These are detailed in modal paragraphs after the table.

Table 1. Consolidated Annualized Capital "Needs" Estimates for All Levels of Government (billions of 1984 dollars)

Category	High Estimate	Low Estimate
Highways	34.1	27.9
Bridges	5.1	3.4
Airports	2.4	1.8
Air Traffic Control	0.5	0.5
Mass Transit	7.3	5.5
Water Resources	5.4	2.2
Wastewater	6.8	5.4
Water Supply	12.0	3.7
Solid Waste	1.2	0.6
TOTAL	74.8	51.0

Airports

The primary source for airports needs data is the National Plan of Integrated Airport Systems (NPIAS) of the Federal Aviation Administration (FAA). Published on a biennial basis, it includes only those projects eligible for Federal aid, and is based on a review of state system and airport master plans, regional planning programs, industry comments from the Air Transport Association, and local input. Both the state system and airport master plans identify aviation facilities necessary for specific airports based on five-, ten-, or twenty-year forecasts of aviation activity, as well as environmental considerations and financial feasibility. The FAA adjusts these estimates to include only those airports included in the NPIAS and modifies growth rates to reflect FAA projections.

As with many major needs estimates, the NPIAS is subject to a certain degree of criticism, but, on the whole, it is the most accurate depiction of airport needs. Estimates are prepared by local authorities on a project-by-project basis and, following review, collected and summarized by the FAA. In this way, the NPIAS avoids the main criticism of many public works needs studies -- a lack of sensitivity to local requirements. However, this also gives rise to the one major problem of the FAA estimates -- variability. Political and economic considerations can sway aggregate projected needs considerably from one period to the next. Between 1984 and 1986, for example, the FAA 10 year estimate of needs increased by $5.8 billion, or one-third (Table 2). The vast majority of these new demands ($3.9 billion) are for the needs of two airports alone.

Table 2
NPIAS 10-Year Capital Needs by Type of Airport
1984 and 1986 ($ Billions)

Type of Airport	Total (1984)	Total (1986)	Change ($)	Change (%)
Commercial Service Airports				
Primary	$ 11.2	$ 17.0	$ 5.8	51.7 %
Other	1.1	1.2	0.1	9.1
Reliever Airports	1.7	1.8	0.1	5.9
General Aviation Airports	4.2	4.4	0.2	4.8
TOTAL	$ 18.3	$ 24.3	$ 6.0	32.8 %

Source: Apogee Research from National Plan of Integrated Airport Systems, (1984 and draft, 1986).

Further, the plan makes no assumptions regarding policy modifications and thus implicitly assumes that current facilities are operated efficiently. Because of the incentives of the Federal grants program, however, there is a tendency to overlook non-capital-intensive solutions, possibly resulting in inflation in the capital estimates (Table 3 classifies the distribution of needs by specific demands.

Table 3
Percentage of Development by Airport Category
and Program Objective
(1986-1990)

Airport Category	Special Programs	Reconstruct	Standards	Upgrade	Capacity	New Airports	Total
Commercial:							
Primary	2	9	29	12	34	11	100
Other	9	15	43	16	12	5	100
Reliever	3	9	34	15	18	21	100
Gen Av	5	9	42	10	6	28	100
System-Wide	4	10	29	12	34	11	100

Source: NPIAS Draft, 1986

Highways

The best highway needs data come from the Federal Highways Administration, Status and Conditions 1987. According to their figures (a discrepancy from the Pisarski report) the estimated capital requirements by all units of government to maintain 1983 overall operating costs for two different rates of growth in traffic range from $27.9 billion a year (2.15 percent annual VMT growth) to $31.1 billion a year (2.85 percent growth). To remove all deficiencies from all roads would cost $34.14 billion a year at the high growth rate and $31.05 billion a year at the lower rate.

These are generally considered the best estimates of need in highways and maybe across any public works category.

Bridge needs are misstated in your paper. Estimates for bridge replacement are as follows:

Replacement:	$35.5 billion
Rehabilitation:	$15.5 billion
TOTAL:	$50.8 billion

Spreading these out over 10 to 15 years yields the estimates in the detail above. Use these with caution -- they are the epitome of wish list needs estimates. Many bridges could defer rehab, post lower load limits, or be abandoned all together.

Mass Transit

Estimates of annual mass transit capital needs range considerably, from \$3.6 billion to \$7.3 billion.[1] In 1983, the Congressional Budget Office estimated annual transit needs to be \$5.5 billion (Table 4). Relative to current program funding levels, this implied a shortfall of \$1.2 billion, or 22 percent of total demand.[2] This projection, based on a critical review of Urban Mass Transit Administration and American Public Transit Association (APTA) estimates, represents the best available estimate of annual capital demand for transit. A recent report focusing specifically on the costs of rail modernization found that, over the next ten years, annual costs would average \$1.8 billion dollars, slightly lower than the CBO estimate, suggesting that even that projection may be slightly high.

Table 4
Estimated Annual Mass Transit Capital Demand
(\$1982 Millions)

Category	Demand
Bus	
Vehicle Rehab & Replacement	\$ 610
Facilities	500
Rail	
Modernization & Veh. Replmnt	2,200
Extension of Existing System	1,191
New Systems	1,012
Total	5,513
Less:	
Estimated Annual UMTA Authorization (incl Local Share)	4,274
Projected Annual Shortfall	\$ 1,239

Source: Congressional Budget Office, Public Works Infrastructure, 1983.

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[1] Congressional Budget Office low estimate assuming the implementation of recommendations and American Public Transit Association (APTA) from survey of members.

[2] For a detailed discussion of the differences between needs estimates, see Mass Transit, a report prepared for the National Council on Public Works Improvement, (July 1987).

The majority of annual needs fall in the category "Rail," and of those, 60 percent are for new systems or modernization. Further, the distribution of capital costs in mass transit is heavily weighted toward the Federal government. Of the $3.9 billion spent on mass transit capital facilities in 1984, for example, $3.1 billion, or 81 percent, was funded through the UMTA capital grants program. Conversely, 83 percent of all operation and maintenance outlays were made by local governments.

Water Resources

Flood Control. There has never been a comprehensive flood control inventory. Assuming that the Water Resources Development Act of 1986 represents contemporary needs estimates, there are over 80 flood control projects that may be built over the next 10 to 15 years at a total cost of $4.6 billion. This can be used as the high estimate, since securing the local share of these projects may prevent some from moving forward. Half, or $2.3 billion is a reasonable low estimate given past experience. There is no estimate of state or local needs in flood control, although the Water Resources Council flagged local flood control as one of the most important local water resources issues yet unaddressed.

Table 5. Water Resources Needs Estimates

Type of Project	Total		Yearly	
	High Estimate	Low Estimate	High Estimate[a]	Low Estimate[b]
Inland Waterways	20.6	11.6	2.1	0.8
Ports & Harbors	12.9	7.9	1.3	0.5
Flood Control	4.6	2.3	0.5	0.2
Others[c]	15.0	10.0	1.5	0.7
TOTAL	53.1	31.8	5.4	2.2

[a] Assumes the high range in cost, low range in period over which projects will be built.
[b] Assumes the low range in cost, high range in period over which projects will be built.
[c] Dam safety, backlog of authorized projects.

Ports and Harbors. The Water Resource Development Act authorized replacement of the Davis and Sabin locks at Sault Sainte Marie, Michigan at a cost of $235 million. The Act also authorizes 35 deepening or widening projects at an estimated cost of $2.7 billion. Since project sponsors will have to share projects costs there is a good chance that the projects could be scaled down considerably.[3] Therefore a 50 percent reduction of 1.5 billion is fairly conservative for the low estimate. Landside facilities primarily the responsibility of private sector could range from $5 billion to $10 billion per year.[4] All these port projects could take 10 years to 15 years to complete.

Inland Waterways. The Nation Waterways Study identified 45 to 62 locks based on traffic projections that would require rehabilitation replacement or supplemental capacity by the early 2000s at a total cost of $6 to $10 billion.[5] Landslide facility needs could range between $5 to $10 Billion over the next fifteen years, depending on future traffic levels.[6] The total also includes U.S. Coast Guard expenditures of $100 million a year. Federal cost could total about $.85 to $1 billion per year and non-Federal costs about $350 and $700 million per year. The majority of non-Federal cost would be borne by the private sector.

Wastewater Treatment

EPA's estimates of wastewater treatment needs are derived from engineering estimates and "best guesses" of the costs to install a minimum of secondary treatment at all publicly owned treatment facilities. While their 1986 estimate rests at some $76 billion, just two years earlier, the EPA estimated that it would take $109 billion to do the same job. The difference lies in the federal redefinition of what constitutes "needs". Between the 1984 and the 1986 estimates, the EPA dropped as eligible for federal assistance, and hence dropped from their official needs estimate, the costs of providing treatment facilities for populations above the current levels and the costs of controlling combined sewer overflow problems. These "needs" did not go away. They are still considered critical to meeting the goals of the Clean Water Act of fishable and swimmable waters.

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[3] Faced with paying half the costs of deepening to 50 feet, for example, Baltimore Harbor scaling back their project and reduced its costs from $300 million to less than $100 million.

[4] Maritime Administration, Public Port Financing

[5] Army Corps of Engineers Institute for Water Resources, The Nations's Public Works: Report on Water Resources (May 1987).

[6] Maritime Administration, Mid-America Port Study, (1979).

In addition, the EPA numbers are strictly engineering estimates based on current cost-sharing conventions. As early as this year and no later than 1992, 55 percent grants will be replaced by loans. The effective cost to municipalities is expected to increase. This should result in smaller, less expensive treatment plants and a consequent reduction in needs estimates. One recent study, for example, found that a 20 percent increase n the local share of secondary treatment plants resulted in a 30 percent reduction in unit costs for the same level of treatment.

The entries in the above table take these two needs estimates as high and low, annualized by the number of years between when they were made and the year 2000 -- EPA's target date.

Water Supply

These estimates were generated on the basis of replacement costs of facilities serving current population plus costs to meet the needs of new populations. They are strictly engineering estimates with assumed useful lives, replacement schedules and average cost estimates according to system size. Though comprehensive, they suffer from a lack of price response. I have little feel for the high range number (which comes from Wade Miller, not from me) but presumably, it is an estimate of the additional costs to install water purification equipment in response to the Clean Water Act of 1986.

Separating Operations from Maintenance

Table 1 presents our estimate of the separation of operations from maintenance, by level of government and by public works category. The O/M breakout was estimated separately for each mode, using the best available information (detailed below). Our working definitions of each spending category are as follows:

- Capital - Expenditures for the engineering design, construction, and construction management of major facilities or for plant, equipment, or rolling stock that create new system capacity, expand existing capacity, or extend its useful life for more than two years (includes major rehabilitation or replacement).
- Maintenance - Expenditures usually on routine schedules to repair or to maintain in good working order, existing facilities, plant, equipment, or rolling stock that neither adds new system capacity nor extends the life of facilities beyond two years.
- Operations - Expenditures on a daily basis for labor, utilities, chemicals, engineering, and other overhead activities that support the day-to-day delivery of services.

Table 1. Government Outlays in 1984 ($Billions)

Category	Federal	State	Local	TOTAL
Highways	11.0	18.9	20.7	50.6
Operations	--	6.3[a]	6.3[a]	12.6
Maintenance	0.1	5.9	9.0	15.0
Capital	10.9	6.7	5.4	23.0
Aviation	3.6	0.4	2.5	6.5
Operations	2.3	0.1	0.9	3.3
Maintenance	0.3	b	0.6	1.0
Capital	1.0	0.2	1.0	2.2
Mass Transit	3.8	1.1	8.4	13.3
Operations	0.5	0.7	5.4	6.6
Maintenance	0.2	0.3	2.3	2.8
Capital	3.1	0.1	0.7	3.9
Water Resources	3.9	1.9	1.3	7.1
Operations	0.7	0.2	0.4	1.3
Maintenance	0.9	0.3	0.6	1.8
Capital	2.3	1.4	0.3	4.0
Wastewater	2.6	2.2	6.8	11.6
Operations	--	--	3.8	3.8
Maintenance	--	--	2.1	2.1
Capital	2.6	2.2	0.9	5.7
Water Supply	0.6	0.5	12.9	14.0
Operations	--	--	3.0	3.0
Maintenance	--	--	6.4	6.4
Capital	0.6	0.5	3.5	4.6
Solid Waste	--	--	4.7	4.7
Operations	--	--	2.1[c]	2.1[c]
Maintenance	--	--	2.1[c]	2.1[c]
Capital	--	--	0.6	0.6
TOTAL	25.5	24.9	57.3	107.8
Operations	3.5	7.3	21.9	32.7
Maintenance	1.5	6.5	23.1	31.2
Capital	20.5	11.1	12.4	44.0

[a] Arbitrarily divided state and local total in half

[b] Less than $100 million

[c] Arbitrarily divided O&M in half

Airports

The division of operations and maintenance expenditures varies by size of airport. For large- and medium-sized commercial airports, operations comprise 62 percent to 67 percent of all O&M outlays.[1] Smaller airports were found to be more labor intensive and more variable in demands on funding. At these facilities, operations, as a percent of all O&M outlays, makes up 66 to 80 percent. Operations expenses include payroll for administrative staff, cleaning and daily operations staff, utilities, and planning. Maintenance expenses include the upkeep of capital facilities, including airfields, buildings, access roads, parking lots, vehicles, and emergency equipment. Estimates were weighted by size to reflect the distribution of funds by level of government

Air Traffic Control

Because of the modernization underway in the air traffic control system, operations and maintenance outlays are dominated by salary expenses. The majority of what would have been investments in facility maintenance is being postponed or passed over in deference to new capital equipment purchases. Thus, operations comprises approximately 90 percent of the combined operation and maintenance outlays ($2.4 billion). Maintenance, the remaining 10 percent, is dedicated to upkeep of existing control equipment.

Highways

Federal Highway Administration data are more detailed than Census data and they were used to estimate the separation of operations from maintenance. They differ from Census in that they are collected for the calendar year, not the fiscal year. The totals differ from our own data base because of this.

The FHWA makes explicit estimates of spending for operations versus maintenance for most types of spending. We used their estimates as given. Still, some borderline items stand out. Grass mowing, for example, is considered a maintenance expense although our working definition would lump it into operations. The FHWA also considers snowplowing and salting roadways maintenance. All operations are state and local responsibilities, but it is not possible to break out state from local, given currently available data. The table reflects this in a footnote.

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[1] This and all other estimates are based on a review of data included in a sample of ten airport annual financial reports. Due to the small size of the sample, these data can only be deemed approximations of ranges and averages.

Mass Transit

Outlays by level of government for mass transit operating and maintenance are primarily (70 percent) for operational expenses. The remainder (30 percent) is used to fund maintenance costs.[2] Operational expenses include salaries to operate transit vehicles and general administrative expenses associated with program operation. System maintenance expenses include both vehicle and non-vehicle maintenance activities such as changing oil in buses, overhauling engines, and repairing vehicle interiors.

Water Resources

The Corps' internal budget estimates differentiate between operation and maintenance expenditures. Operations cover salaries, energy, and other costs to operate locks and dams; multi reservoir release control; and general administrative costs for overhead activities within headquarters. Maintenance activities include maintenance dredging of shallow and deep-draft channels; upkeep of pumping equipment and hydroelectric generating turbines, maintenance of recreation areas, and so on. Based on estimates received from the Corps' Budget Office, 42 percent of the total O & M budget is comprised of operations and 58 percent is maintenance. These percents do not differ greatly among the major project purposes such as flood control, navigation, or multi-purpose reservoirs. The Corps' breakout for operations versus maintenance was also assumed at the state and local level.

Water Supply

Water supply figures are more difficult to ascertain because the apportionment of operation and maintenance costs are based on the accounting practices of each utility. To break out operations from maintenance, data from two water utilities were used: Phoenix, Arizona and Springfield, Illinois. Based on these utilities and conversations with experts in the field, the operations account for 68 percent of O&M and maintenance accounts for 32 percent.

Maintenance activities include: plant upkeep, machine repair, conveyance system repair, fire hydrant servicing, valve repair, and meter repair. Operations cover energy, chemicals, administrative salaries, and billing expenses.

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[2] These estimates were developed from analysis of data compiled on an annual basis by the American Public Transit Association and presented in the Transit Fact Book (various years).

Testimony of

Dana Huestis

for

The Associated General Contractors of America

Presented to

The Committee on Environment and Public Works

The Subcommittee on Water Resources, Transportation and Infrastructure

United State Senate

on the Topic of

Infrastructure Investment

October 6, 1987

AGC is:

- More than 32,500 firms including 8,000 of America's leading general contracting firms responsible for the employment of 3,500,000-plus employees;
- 105 chapters nationwide;
- More than 80% of America's contract construction of commercial buildings, highways, industrial and municipal-utility facilities;

INFRASTRUCTURE NEEDS: THE GENERAL CONTRACTOR'S VIEW

DANA HUESTIS
PRESIDENT, ASSOCIATED GENERAL CONTRACTORS OF AMERICA
FALLS CONSTRUCTION COMPANY
GREAT FALLS, MONTANA

America in Ruins, a landmark study of the decline of public facilities by economists Pat Choate and Susan Walter, sponsored by the Council of State Planning Agencies, was published in 1981. It was the first major comprehensive and statistically-supported review of the deteriorating condition of America's basic public facilities. The authors pointed out the downward trends of public works investment over the past 20 years. They quantified the effect of public works spending on the economy and recommended methods for improving public works financing. And they warned that failure to give attention to basic public facilities would prove to be a critical bottleneck to national economic revival.

Did America in Ruins overstate the evidence of neglect? No, because the findings of the study have withstood the test of time. The authors' premise cannot be refuted: As a nation we have not been investing enough in our public facilities to either keep up with new growth or to rebuild and protect what is falling into disrepair. Replacement of obsolete public works is being deferred. New construction starts have been postponed or cancelled. The infrastructure crisis is real.

Although the total magnitude of the problem was not identified in America in Ruins, the study's conclusion specified the need for increasing public works funding to a level far above current spending levels. Potential sources of public works financing include privatization, user charges, debt-financing and dedicated taxes at state and local levels of government. Realistically, a blend of traditional and alternative financing strategies would be necessary to provide sufficient funding for an all-encompassing infrastructure rebuilding campaign. Anything less would be condemning America's public facilities to a state of continual decline.

Following America in Ruins, a variety of public and private organizations issued reports documenting the nation's infrastructure needs, with suggestions of ways to satisfy those needs. Among the reports were:

America's Infrastructure - A Plan to Rebuild - (Associated General Contractors of America) - This May 1983 study listed a sizeable array of public facilities, including many areas not covered in other reports such as prisons, ports, schools, railroads, hospitals and storm drainage structures.

AGC surveyed existing literature and studies on infrastructure needs and contacted over 100 organizations, states and cities in an effort to develop a documented estimate of necessary investment to meet presently identified infrastructure needs. The AGC research revealed a minimum necessary capital investment of approximately

$3.03 trillion. While the time frame for addressing such needs varied in the individual infrastructure categories, a weighted average indicated that most investment is projected to be necessary within the next 19 years.

The $3.03 trillion must be viewed as a minimum figure. There are a number of significant infrastructure categories for which no needs information exists, and can't be included in the $3.03 trillion estimate. Such omissions include rural potable water needs; parks, certain health care facilities; levees, dikes and revetments; libraries; firehouses, federal, state and local office buildings; among many others. Complete information on all such infrastructure needs would significantly increase the presently identified $3.03 trillion estimate.

Hard Choices - A Summary Report of the National Infrastructure Study - (Joint Economic Committee of Congress) - The Joint Economic Committee of the United States Congress issued 'Hard Choices' in February 1984. Using governmental estimates from the Bureau of the Census and the Department of Commerce, the study projected $1.157 trillion in needs through the year 2000. The categories included in the study were somewhat circumscribed: highways and bridges; other transportation; water supply and distribution; and wastewater collection and treatment. With $714 billion of expected revenues within the 16 year time period, a shortfall of $443 billion was projected for the four categories.

Rebuilding America's Vital Public Facilities - (Labor-Management Group) - The Labor-Management Group, a private, non-governmental group of labor and business leaders published its consensus infrastructure report in October 1983. Members of the task force include Lane Kirkland (AFL-CIO), Roger Smith (General Motors) and others from the nation's leading labor and business organizations. Concentrating on publicly-operated infrastructure facilities - highways, bridges, urban water supply systems and wastewater treatment facilities - the researchers determined that the annual investment spending requirement for the aforementioned facilities is $38 billion per year for the next 12 years. Based upon planned expenditures, the study estimated that the annual shortfall for these categories of infrastructure facilities would be in the $8.5 - 10.8 billion range.

Public Works Infrastructure: Policy Considerations for the 1980's - (Congressional Budget Office) - In April 1983 the Congressional Budget Office compiled a 140 page study of the public works funding dilemma. Seven infrastructure 'systems' were examined by CBO: highways, mass transit, wastewater, water resources, air traffic control, airports and municipal water supply. The agency pointed out that its research did not include many other public facilities, such as schools, hospitals, prisons and most flood control barriers.

Under current policies, the CBO estimated that annual capital outlays by all levels of government would have to increase from $36 billion to roughly $53 billion between 1983 and 1990 to remedy the problems of just the seven infrastructure 'systems' profiled in the study, which do not include many other categories of infrastructure.

State and Local Capital Spending and Borrowing: Levels of Need and Costs of Financing - (Government Finance Research Center, Municipal Finance Officers Associations, March, 1984) - For state and local capital spending, this study estimated an annual need (in 1982 dollars) of $95.9 billion through the end of the decade, with $70.3 billion annually to be financed by states and localities from their own sources. This represents a 52 percent increase over the current level of spending.

The five major studies which inventoried and projected national infrastructure needs all did so in different fashion depending on the definition of infrastructure used, the selection of basic resource material used to make projections, and the time frame addressed.

While these various studies are not consistent in the use of these variables, and consequently, not consistent in projections as to the magnitude of the infrastructure problem, without exception all the studies agreed that:

- an inadequate national infrastructure system poses increasingly serious health, safety, and economic growth problems.
- a significant shortfall in infrastructure funding exists.

That a substantial portion of the nation's basic, publicly-financed infrastructure system is inadequate is no longer a matter of debate.

The definitive case for rebuilding America's infrastructure rests on persuasive and overriding concerns for the public health and safety. While these issues are of paramount importance, the infrastructure's distinctive position as the base on which the nation's economic activity is built leaves no doubt that a continued shortfall of investment in public facilities will have extremely serious consequences for the nation's economy. The infrastructure is composed of a network of public capital goods which provide the foundation for a smoothly functioning economy when existing facilities are diligently maintained and when new investment keeps pace with the needs of growth.

The importance of the infrastructure can hardly be understated, however; an adequate infrastructure is the key to economic growth and competitiveness. The competitiveness of American industry, and the ability of our economy to respond quickly to changing market conditions and demands, is in very large part dependent upon the foundation which is laid by our nation for economic growth. I believe that foundation is our nation's infrastructure.

Much has been said about the roles that privatization, increased research and development, improved management techniques and education can play in assisting economic growth. These elements are indeed helpful. But they will not, in and of themselves, solve our infrastructure crisis. Only through increased capital investment will our nation be provided the public facilities necessary for a modernizing, growing and competitive economy.

Deferring action on the infrastructure crisis will only result in a much larger, and more expensive, problem for this nation to solve later on. Every delay adds to the cost of infrastructure repair, and the magnitude of the infrastructure investment needed magnifies the long-term consequences of inaction. While federal budget deficits are of course a very real concern, budget decisions should be made judiciously, sacrificing the least in terms of the country's future potential.

We cannot afford to sacrifice infrastructure investment for short-term budgetary gains. To do so will only saddle future generations with a low-growth and non-competitive economy that unfairly penalizes them for this generation's fiscal shortsightedness.

The construction industry remains underutilized in this country, and the capacity now exists for our industry to undertake any level of infrastructure program put forward not only by the Congress, but by state and local governments as well. The construction industry's reliance on the competitive low-bid process will continue to ensure that infrastructure facilities are constructed in the most cost-effective manner possible.

Let me emphasize, however, that the capacity of the construction industry to build, to provide direct employment on construction sites and induce employment in industries dependent on a strong construction industry for their own good health, should not be the sole or even a primary yardstick for infrastructure investment. Neither the U.S. Congress or America's taxpayers have any obligation to provide construction contractors with a means of livelihood. The imperative obligation is that Congress and public officials recognize that falling investment levels are jeopardizing America's infrastructure. The consequences of continued neglect will guarantee second class status for our country.

AGC is becoming increasingly concerned that other pressures on a busy Congress too frequently result in needless delays to securing legislation that the vast majority of members of Congress recognize as necessary legislation.

Three examples will serve to illustrate this point. The first is highway and transportation legislation that was finally passed in March of 1987 but that really should have been in place by October 1, 1986.

A second example, well documented on the public record, is the 18 month delay of Clean Water legislation finally enacted in February 1987. As a result of this inordinate delay, this essential program was substantially underfunded in fiscal year 1987.

A third example exists today, even now, where a deadline has come and gone to reauthorize the Airports Development Program.

Time and again the public has demonstrated willingness to pay for needs that must be met. A specific example of that is demonstrated by the fact that in November 1986 the public approved 85 percent of bond issues providing more than $7 billion for infrastructure investment. Yet, in too many instances, of which the Airports Development Program is the most recent example, the public is not getting, on a timely basis, what it largely pre-finances. Accordingly, AGC urges you to do everything possible within the framework of the Congressional workload to give a higher priority to securing infrastructure legislation in a timely manner.

AGC is also obliged to point out that despite the wide range of studies that demonstrate the need for a substantially increased infrastructure investment, there continues to be more talk and debate on the subject than real action. Some of that debate falls short of a realistic examination of the enormity of the problem. For example, AGC is dismayed by occasional reports that the solution to America's airport needs may be to schedule more flights at night. Given the enormous needs that exist and given projections for the continued growth of air transportation, it borders on fantasy that the problem can be addressed by transferring overload capacity at night to airport facilities that are clearly inadequate in the light of day.

For further action on infrastructure by the close of this session of Congress, AGC therefore makes the following four recommendations:

- First, Congress should move quickly to reauthorize the Airport and Airways Improvement Program. Authority for the program was allowed to expire on September 30th despite increasing concerns by all over the safety and adequacy of our nation's air transportation system.

- Second, both the airport and airway trust fund and the highway trust fund should be removed from the unified federal budget. Users of our transportation system have paid into these trust funds believing that their contributions would be used to finance added capacity and safety improvements. Taking these trust funds off budget will ensure that the dedicated funds paid in by the public will be spent for their intended purpose.

- Third, AGC urges the Congress to revisit provisions of the Tax Reform Act of 1986 which imposed limitations on the tax-exempt financing capacity of state and local governments. Those limitations are having a negative impact on infrastructure investment.

- Fourth, the Congress should also take action to make sure that Congressional intent with regard to the Clean Water Amendments is not allowed to be circumvented by the Office of Management and Budget. The Environmental Protection Agency recently issued implementing guidance to the states. But EPA's guidance fails to address a very key issue -- the funding mechanism for the state revolving funds which are the cornerstone of the program.

> AGC understands that this issue was not addressed for a very specific reason -- the Office of Management and Budget wants the states to undertake the front-end financing of the program and provide the necessary capitalization, with the federal government only reimbursing project costs after the fact. This abdication of federal responsibility and leadership will clearly be harmful to the smooth implementation of this program, and AGC urges Congress to take any action necessary to make sure that the original intent and design of this vital infrastructure program is not subverted.

For action during the remainder of the 100th Congress, AGC recommends that the following two legislative goals be pursued to address the infrastructure crisis:

- First, Congress should enact a capital budgeting process that will give the Congress enough information to make fully informed decisions on federal spending choices. A budget that clearly delineates between short-term, current spending and long-term capital investments in infrastructure, will return economic benefits and enhance the public health and safety for generations to come.
- And last, but certainly not least, Congress should enact a major capital infrastructure program that would assist state and local governments in meeting their infrastructure investment needs.

All levels of government must address this crisis. While state and local governments are shouldering more and more of the infrastructure burden, the federal government must take a positive stance, providing both leadership and adequate funding in those areas where a federal role is appropriate and necessary.

AGC has been studying the dimensions of the infrastructure crisis since 1981, and has published six studies to date on the topic. A seventh study is now being prepared analyzing and explaining the vital link between infrastructure investment and economic competitiveness. AGC will of course make this study available to the Committee as soon as it is completed.

Since 1967, the percentage of the Gross National Product (GNP) devoted to spending by all levels of government on public works has dropped from 3.5 percent to 2.7 percent. Despite the growth in total government expenditures, spending on public construction has failed to keep pace with inflation in almost every year since 1968. The percentage of the federal budget devoted to construction dropped from 7.9 percent in 1980 to 4.7 percent by 1986.

This disinvestment has become a crisis because economic renewal depends on an adequate infrastructure. When a community wastewater treatment system is operating at 80 percent of capacity, for example, it cannot add industrial load. A Department of Commerce survey reports that 50 percent of these systems nationwide are operating at 80 percent of capacity or higher. This means 50 percent of the nation's communities are in a no-growth status.

While the infrastructure crisis is clearly a challenge facing us, I feel that it is also a great opportunity. American businesses are now facing many competitive challenges. These challenges can and will be met if we as a nation provide for the public infrastructure which is so necessary for economic growth.

The question of whether the nation can afford to move ahead with infrastructure rebuilding is the wrong question.

The correct question is "Can we afford not to move ahead with increased investment in our nation's infrastructure?"

The answer is we cannot.

THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA
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F. THOMAS WESTCOTT, *Treasurer* HUBERT BEATTY, *Executive Vice President*

November 9, 1987

The Honorable Quentin N. Burdick
Chairman
Committee on Environment and Public Works
United States Senate
Washington, D.C. 20510

Dear Chairman Burdick:

AGC is most pleased to provide the enclosed responses to the questions posed in your letter of October 9.

Thank you once again for inviting AGC to participate in the October 6 hearing.

AGC looks forward to continuing to assist the committee in developing realistic solutions to our nation's infrastructure crisis.

Sincerely,

Dana Huestis
President

Enclosure

RESPONSES TO CHAIRMAN BURDICK'S FOLLOW-UP QUESTIONS

1. What do you think is the single most effective and feasible action Congress could take to strengthen the infrastructure of this nation?

Congress should increase its commitment to existing Federal infrastructure programs by maximizing funding through the budget process for infrastructure investment. In particular funding for trust-funded programs, such as the Federal-aid highway, airport improvement, and inland waterway programs should be maximized since they are user financed and do not contribute to the deficit.

An equally important facet of this commitment is to ensure that Congressional intent is followed with regard to federal infrastructure programs. For example, the Environmental Protection Agency, at the direction of the Office of Management and Budget, would use a letter of credit mechanism to "capitalize" the state revolving loan funds established by the Clean Water Amendments. Congress clearly had intended that direct capitalization grants be made to the states for a smooth, and speedy, start-up of the revolving loan funds. The vigilance of the Congress in recognizing, and reversing, subversion of Congressional intent such as EPA's guidance on this issue will ensure that the fullest use is made of federal programs to rebuild the infrastructure.

2. What do you see as the proper Federal role in funding infrastructure programs?

In areas of the infrastructure where the federal government has a primary responsibility, such as providing the means for the smooth flow of interstate commerce, the federal role necessitates adequate federal investment for demonstrated infrastructure needs.

The proper federal role also should encompass a responsibility to facilitate the efforts of state and local governments to finance their infrastructure needs. In this respect, the federal government should re-examine provisions enacted in the Tax Reform Act of 1986 which have dramatically limited the ability of state and local governments to secure much-needed capital for infrastructure investment. Glaring examples of the problems created by tax "reform" are the curtailment of tax-exempt issuances for infrastructure projects with more than ten percent private participation and the stringent state volume caps on many types of infrastructure projects still eligible for tax-exempt financing.

3. What Federal spending serves the national interest and is, as stated in your testimony, "appropriate and necessary"?

As stated in 1776 by Adam Smith in An Inquiry Into the Nature and Causes of the Wealth of Nations, "The third and last duty of the Sovereign or commonwealth is that of erecting and maintaining those public institutions, and those public works, which, though they may be in the highest degree advantageous to a great society, are, however, of such a nature, that the profit could never repay the expense to any individual or small number of individuals, and which it therefore cannot be expected that any individual or small number of individuals should erect or maintain."

An excellent example of Federal spending that appropriately and necessarily serves the national interest is the Federal-aid highway program. The construction and repair of the Interstate and Primary highway system is a challenge that is truly in the national interest and necessary, for in the absence of a Federal program many States would be unable to meet highway investment needs and the economic growth and defense of the entire nation would be impaired. Although current funding for the program is well below the level known to meet future needs, the funding mechanism is appropriate because the program is financed through users fees which tie the level of highway investment and cost responsibility to the use of the highway system.

No less important is the expansion of the nation's air transportation system to provide for the growth in air travel. The public clearly expects the federal government to act in an appropriate way to maintain a margin of safety in air transportation, and to build sufficient runways and airports to prevent unnecessary, lengthy delays.

In the water resources area as well a federal role is both appropriate and necessary. The construction and repair of facilities vital to interstate commerce is more than sufficient reason for continued federal involvement. Water resources needs and projects are rarely confined within state or local boundaries; for these infrastructure needs, a federal role with adequate federal funding to augment user fees is clearly indicated.

4. "How can Federal policies encourage the selection of cost-effective projects in general, including an appropriate balance in investments between new construction and maintenance?"

The Federal-State partnership can be enhanced by encouraging decision-making at the state and local level, under broad federal guidelines which do not restrict choice, which do not impose overly strict specifications and which do not impose social goals totally unrelated to the purpose of the project.

Local decision makers can best determine whether new construction or maintenance is needed. For example, EPA recently issued the guidelines for implementation of the state revolving loan funds which include a provision which requires states to negotiate a fair share objective with EPA on the use of minority owned businesses in the program. This social engineering provision will add to the cost of building these facilities and yet add nothing to the accomplishment of Clean Water Act goals.

5. Many states and localities are turning to some form of private sector equity participation to address their infrastructure needs.

   What experience has AGC had with this type of privatization?

   AGC defines "privatization" as "the use of the private sector to provide the financing, and the design, construction, operation and ownership or any combination thereof, of public facilities and/or services."

   AGC believes there are two primary reasons why governments are increasingly interested in privatization:

   - A growing awareness of the infrastructure crisis; and
   - A lack of revenue from traditional public sources (and in many cases an unwillingness on the part of public officials to increase those traditional revenue sources) to meet pressing infrastructure needs.

   AGC has found that privatization is growing as an alternative delivery system for much-needed public infrastructure facilities. AGC believes that the benefits of privatization are maximized when the selection procedure for the construction component of the privatization process provides for open competitive bidding, with award to the lowest responsive bidder.

6. Your testimony speaks in terms of infrastructure investment. Can you explain the difference between spending and investment?

   Spending by the federal government is not adequately broken down by government accounting methods into current spending and expenditures on capital assets which will continue to return benefits to future generations. Infrastructure expenditures are clearly investments in our nation's future, as these capital improvements will provide the foundation for economic growth not just this year, and not just next year, but for decades to come.

7. Please elaborate on the problems you foresee with the Office of Management and Budget's approach to capitalizing the state revolving loan funds.

Capitalization grants were included in the Water Quality Act of 1987 to assist states in establishing revolving loan funds to continue progress towards Clean Water Act goals. The loan program is intended to provide a permanent source of funding for clean water projects as a replacement for direct federal grants.

The use of a letter of credit, instead of an upfront cash payment, seriously jeopardizes the potential for success of revolving loan funds. The letter of credit will result in hundreds of millions of dollars lost from the funding of wastewater treatment projects. Leveraging is seriously undermined because without the cash in the bank state governments will not be able to borrow funds as easily, if at all, and at a much higher interest rate, as a result of lower bond ratings for the loan funds.

The letter of credit concept of paying capitalization grants will slow down the short term availability of funds for wastewater treatment projects. This will place local governments in the position of trying to meet the July 1, 1988 water quality deadline without the financial backing that had been promised when the Act was passed. It also undermines the long term prospects for these funds because inflation and ever increasing needs will eventually deplete the funds available. This seriously threatens the achievement of Clean Water Act goals.

Before the

UNITED STATES SENATE SUBCOMMITTEE ON WATER RESOURCES, TRANSPORTATION, AND INFRASTRUCTURE OF THE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

OCTOBER 6, 1987
WASHINGTON, DC

Statement of the

AMERICAN TRUCKING ASSOCIATIONS

On

THE NATION'S INFRASTRUCTURE PROGRAM

Thomas J. Donohue
President and Chief Executive Officer

Introduction and Executive Summary

I am Thomas J. Donohue, President and Chief Executive Officer of the American Trucking Associations. I welcome the opportunity today to present the view of the trucking industry on the infrastructure condition and needs of our nation. Good highways are of prime importance to the trucking industry. I appear before you today as a strong supporter of this Committee's continuing effort to improve the highway infrastructure.

My statement is on behalf of ATA, the national trade association of the trucking industry. Through its 51 affiliated trucking associations located in every state and the District of Columbia, 10 affiliated conferences, and several thousand motor carrier members, ATA represents every type and class of motor carrier in the Nation: for-hire and private; regulated and exempt.

The trucking industry is composed of more than 260,000 American firms, and accounts for 77 percent of all freight transportation revenues in this country. The industry employs 7.4 million Americans and generates annual revenues in excess of $200 billion.

Without question, the greatest civil works effort in history is America's Interstate highway system. Now nearing completion, these 42,500 miles of roads were entirely financed by highway taxes assessed on automobiles and trucks in advance of construction. There is no question that this system has been a phenomenally successful investment.

Although America has lately come to recognize that it has not kept up with its urgent infrastructure needs, since 1982 the nation's highway and bridge program has been revived and greatly expanded. This progress was paid for by more than doubling the federal gasoline tax, from 4¢ to 9¢ and by almost quadrupling the diesel fuel tax from 4¢ to 15¢; other truck taxes have also been significantly increased. The same pattern of tax increases has also occurred in the states.

The result is a slow but steady improvement in our highway infrastructure. Yet highway congestion remains the number one transportation problem in most of our major metropolitan areas, and bridges remain critically insufficient on our rural highway systems.

As a result, we must not attempt to solve our other infrastructure or our deficit reduction problems by siphoning off highway user taxes for other than highway construction and maintenance purposes. This is a major concern which we share with other highway user groups. The Secretary of Transportation and the National Council on Public Works Improvement have both concluded that the benefits of investments in the highway infrastructure greatly exceed the costs. In today's competitive trucking environment, lower operating costs mean savings to the shippers, and make our nation more efficient and competitive internationally.

A strong federal role in the highway program has produced the integrated interstate highway network which makes these benefits possible. We believe that a strong federal role in support of other infrastructure investments, through trust funds where possible, can provide the leadership to bring about other critical infrastructure investment programs. For this reason we have accepted in principal the findings of the Private Sector Advisory Panel on Infrastructure Financing and the recommendations of the panel.

The success of the Interstate highway program is based on two essential elements: 1) a clearly defined objective and 2) dedicated revenues which permitted long term planning. These same two elements must be incorporated into any new infrastructure program. We support the continued Highway Trust Fund, Transit Trust Fund and Airways Trust Fund.

Devising a clearly defined objective requires both a vision and a clearly articulated strategy. We must invest in planning and research and development work to find new, cost-effective solutions to old problems. ATA is actively participating in the Transportation 2020 Consensus Program - a program designed to develop a transportation agenda well into the 21st century. We are cooperating with the Highway Users Federation, AASHTO and others to develop that consensus.

The Consensus Program must be based on not only planning but also research and development designed to find new cost effective solutions to old problems. We believe that a complete review of highway design and building programs is needed. The trucking industry is dedicated to advancing highway research activities through our Trucking Research Institute which is funding three research studies. We are also participating in the Strategic

Highway Research Program (SHRP) at the Federal Highway Administration. We are actively involved in research at TRB and the University of Michigan and other public and private research programs which seek the most constructive long term solutions to our highway needs. New research and innovative thinking on highway design and construction is critical to improve productivity, especially in urban areas.

Additional investment in most infrastructure programs may be necessary. But much can be done within current programs.

- o Let's spend the 14 billion dollar balance in the Federal Highway Trust Fund and the huge balances in the Transit and Airways Trust Fund.
- o Let's tax gasohol at the same rate as other highway fuels.
- o Let's eliminate evasion of current federal user taxes and prevent exemption from taxes for any class of vehicles.

Finally, let's use our highways as productively as we know how.

- o Let's permit the combination vehicles approved by the 1982 Surface Transportation Act to operate on all roads and streets where they can be safely accommodated.
- o Let's allow the development of a regional longer combination vehicle network in the West as the Federal Highway Administration has found to be entirely feasible.

o Let's apply our ingenuity and creative thinking to solving infrastructure problems in a private/public partnership that reaches for new solutions to old problems.

THE HIGHWAY INFRASTRUCTURE

In 1956 President Eisenhower signed the Federal-Aid Highway Act which launched "the greatest peacetime public works program in the history of the world." With perfect hindsight, we can look back on this program as not just a public works project, but as one of the most productive investments ever undertaken by government. Public investment in our highway system reduces the cost of moving people and goods which directly reduces the cost of other goods and services exchanged in the economy. Reducing the cost of transportation provides for a more productive use of the nation's resources and positively affects GNP. In 1985, transportation accounted for 5.3% of GNP. In addition to accounting for over 85% of total domestic passenger travel, our road system moves 77% of all freight (based on freight revenue shares).

Today there is a growing concern that America is not making necessary investments in the nation's infrastructure. Underinvestment is taking place in numerous categories including: highways, bridges, wastewater treatment facilities, water supply, irrigation systems, flood control, mass transit, and air transportation facilities.

Underinvestment in our nation's highways was a major problem during the 1970s, but there has been substantial improvement in recent years despite the fact that not all of the Federal Highway Trust Fund revenues are being appropriated for highways. The growth in federal Highway Trust Fund revenue resulting from the increase in federal highway user taxes, under the Surface Transportation Assistance Act of 1982, and subsequent increases in state user taxes have provided a substantial infusion of funds into the highway program. Increases in the heavy vehicle use tax and the federal tax on gasoline from 4 to 9 cents per gallon, plus a subsequent increase in the federal tax on diesel from 4 to 15 cents per gallon, more than doubled the amount of money available for construction and improvement in the Highway Trust Fund. The highway user revenue flowing into the Trust Fund has increased from $6.7 billion in 1982 to $13.5 billion in 1985. State highway user fees have increased from $20.1 billion to $26.9 billion over the same period.

According to a report by the National Council on Public Works Improvement, these new revenues have resulted in rapid progress in the condition of pavement surfaces. In a June 1987 report on The Status of the Nation's Highways: Conditions and Performance the Secretary of Transportation reported that between 1983 and 1985 vehicle operating costs decreased an estimated 2.1 percent. The Secretary stated that the reduced user costs "imply a real improvement in the effective performance of the Nation's streets and highways in response to the additional capital improvements made possible by the STAA of 1982."

While the condition of pavement surfaces is improving and vehicle operating costs are falling, substantial highway needs clearly remain to correct structural deficiencies and expand road capacity. The desirability of investing in the nation's highways is all the more evident when it is recognized that highway investment has real dollar returns in the form of operating cost savings. For example, the Department of Transportation has estimated that operating costs could be reduced by about 6 cents per vehicle mile by 1995 with increased highway investment. Based on the current national total of approximately 1.7 trillion vehicle miles traveled, this would produce direct annual savings of over $100 billion.

While the benefits of reduced operating costs are substantial, there are other direct and indirect benefits of highway investment which significantly affect the productivity and competitiveness of the economy. These benefits include:

Reduced travel time for commuting, business, and recreation;

A reduction in petroleum consumption;

Reduced inventory costs;

Improved safety; and

Improved access to land, property and markets.

A FUTURE HIGHWAY PROGRAM

The Interstate program is nearing completion and a new consensus for future highway infrastructure investment has become the subject of an intense review in the entire transportation community. Much of the discussion on future highway investment has been directed at solving the growing traffic congestion problems in all our major urban areas. The American Trucking Association is actively participating in this discussion and has joined the Transportation 2020 Consensus Program to develop a new, national transportation program that will meet the nation's needs well into the 21st century.

We believe that solving these problems will require a complete review of the highway design and building programs in metropolitan areas. Past design and construction of arterials and other urban routes have not stood the test of time. How can designs and construction programs be revamped? We are concerned that too many metropolitan highway projects are constructed with built-in bottlenecks and traffic restrictions which result in simply shifting congestion from one point to another on the same route, or worse still, do not provide any relief because of flawed design. New research and innovative thinking on highway design and finance is critical to improve highway productivity in urban areas.

RESEARCH

There are a number of research programs underway in the Department of Transportation and other groups (including those sponsored by the trucking industry) which are looking at various aspects of the highway problem.

The Long Term Pavement Monitoring study of the Strategic Highway Research Program will undoubtedly provide a great deal of information over the years in regard to performance of differing types of pavement under varying climatic conditions. This should improve the ability to produce the most cost effective and durable pavements in the future.

The Highway Performance Monitoring System program at the Federal Highway Administration is also producing a substantial amount of information concerning highway performance and traffic data. Review of this program may well produce more specific information which will lead to new highway designs and programs.

Two research programs sponsored by the Trucking Research Institute, a part of the ATA Foundation, may also have a direct bearing on future highway programs.

> The first is a study at the University of Maryland of the actual load carrying capacities of various bridges commonly

constructed on major highways which will provide important insight into trucks and bridges.

A second TRI study reviewing load equivalency factors will provide new insights into the effects of trucks on pavements.

The Transportation Research Board also has a number of research programs, some directed by the Congress, which are addressing many aspects of highway transportation. All of these research programs deserve continued public and private financial support to provide the data and analysis that will be required for making productive and cost effective investments in the nation's transportation system.

IMPROVEMENTS TO THE EXISTING HIGHWAY PROGRAM

Highway design standards must be evaluated to seek solutions to current congestion problems. Highway users demand and are willing to pay for the infrastructure if and when they are offered a solution.

While additional investments in highway infrastructure are desirable, there are a number of adjustments that can be made within the existing infrastructure to make the highway program more efficient.

First, the Hayden-Cartwright Act of 1934 declared that "it is unfair and unjust to tax motor vehicle transportation unless the proceeds of such taxation are applied to the construction, improvement, and maintenance of highways." This provision is still included in Sec. 126 of Title 23 of the U. S. Code. The trucking industry believes that road user fees should be solely dedicated to roads and should not be used to reduce the federal budget deficit.

Second, in addition to dedicating road user fees to roads, it is important that the fees collected be spent when they are needed. In 1986, the Congress failed to renew the federal highway program before adjourning. This caused many states to run out of money and delayed critical highway projects. It is important that Congress in the future reauthorize highway expenditures promptly in order to provide continuity of investment in the highway infrastructure. In addition, not all of the revenues collected from highway users have been spent. The Highway Trust Fund has a current account balance in excess of $14 billion. To facilitate continuity in expenditures and provide the infrastructure that highway users have paid for, the trucking industry supports efforts to place the Highway Trust Fund off budget.

Third, while all users benefit from the highway system, not all users are contributing their fair share to the construction and maintenance of that system. Specifically, individuals with motor vehicles that use gasohol enjoy the same benefits as individuals that use gasoline or diesel but those using gasohol contribute less revenue to the highway system. The revenue loss to the Highway Trust Fund from the 6 cents per gallon federal excise tax exemption for gasohol amounted to $480 million in 1986. Since 1979, losses to the Highway Trust Fund from the gasohol tax exemption have amounted to approximately $2 billion. In addition, tax exemptions for gasohol at the state level total over $300 million annually. Eliminating these subsidies would provide a large amount of additional revenue to finance highway infrastructure improvements.

Fourth, the Surface Transportation Assistance Act of 1982 resulted in very large tax increases for the trucking industry. Heavy trucks, which represent only 1% of all vehicles, paid nearly $4.5 billion or 33% of 1985 federal highway user taxes. Nonetheless, the productivity benefits promised in STAA associated with size and weight changes have not been fully realized. While a great majority of the states have permitted access to the 102-inch-wide twin-trailer and 48-foot trailer combinations approved by the Act, there are a limited number of key states that have highly restrictive access provisions for these truck configurations. Pennsylvania allows these vehicles to travel only 0.2 miles off the designated highway network and New York allows these vehicles only 1500 feet off the designated network, except by access permit. This does not mean 48' semitrailers or twins should be operating on all city streets. That makes no business sense. These units need to operate to shippers facilities and terminals which are generally in concentrated areas of a city. Federal intervention requiring these and all other states to comply with the intent of the 1982 Act would lower transportation costs and increase the productivity of the nation's transportation system. The trucking industry supports S.1391, the legislation introduced by Senator Exon which seeks to solve the access problem.

A related access problem stems from states that restrict parts of the Interstate system to trucks. Kentucky and Tennessee have restricted sections of three Interstates to truck traffic. Truck taxes paid for the construction of these highways but trucks are being denied the use of these facilities. These restrictions place a real burden on the trucking industry and raise the cost of transporting freight. Additional productivity gains would be available through an expansion in the number of states allowed to operate longer combination vehicles. The Federal Highway Administration has conducted two studies and concluded that a regional longer combination network in the West is feasible.

THE FEDERAL ROLE

Another major topic of debate concerns the role played by the federal government in helping state and local governments finance additional infrastructure. Over the years, the federal government has indirectly encouraged state and local investment in infrastructure through the availability of tax-exempt municipal bonds, favorable depreciation allowances, and investment tax credits. However, recent changes in the federal tax code have placed increasingly severe restrictions on the use of tax-exempt bonds. These changes will reduce the volume of state and local debt financing, and make even traditional governmental bonds more difficult and more costly to issue.

The trucking industry supports a strong federal role in infrastructure financing. Public expenditures for roads represent an investment that, in a very real sense, determines how productively the trillion dollars that Americans have invested in motor vehicles can be used. A federal program is necessary to serve and promote interstate commerce and provide continuity to infrastructure investments that transcend state jurisdictional boundaries. Therefore, we oppose efforts aimed at a federal tax turnback or revenue return to the states.

To help state and local governments finance infrastructure investment, the trucking industry accepts in principle the conclusions and recommendations of Senator Domenici's Private Sector Advisory Panel on Infrastructure Financing.

Public-private partnerships are becoming increasingly common in the areas of road and highway transportation and mass transit. These usually consist of private sector contributions to the financing of transportation facilities, including roads and associated expenditures such as sidewalks and lights. There are good reasons to encourage partnerships in which the developer contributes resources to a transportation project in exchange for zoning changes, special building permits, etc. The trucking industry supports the increasing use of impact fees and special assessments based on the premise that those benefiting from the development of an area should assume some of the burden of dealing with the consequences of development such as increased traffic flow.

However, we oppose the building of toll roads as a means of financing highway infrastructure. Toll roads represent a form of double taxation which is especially burdensome to the trucking industry. Users of toll roads pay directly for the use of these facilities. In addition, these same individuals must continue to pay all state and federal user taxes even though these taxes are not being used to construct the toll facility. In addition to double taxation, toll roads reduce the flow of traffic by forcing users to stop and pay the toll.

Our nation's productivity can be increased by making adjustments to existing programs. These adjustments include:

> Spending the billions of dollars that have accumulated in the federal trust funds for

highways, mass transportation, and aviation;

Taxing gasohol at the same rate as other highway fuels;

Stopping the diversion of trust fund revenues;

Eliminating unreasonable access restrictions that prevent the use of combination vehicles approved by the 1982 Surface Transportation Act; and

Developing a regional longer combination vehicle network in the West.

Nevertheless, additional investment in the nation's infrastructure is necessary to keep America strong and competitive. The success of the Interstate highway program was based on two essential elements: (1) a clearly defined objective that enjoyed broad public support, and (2) the establishment of the Highway Trust Fund which collected revenues from all highway users and dedicated those revenues to constructing and maintaining the highway network. We believe that the basic features of the federal highway program provide guidance to future infrastructure investment.

AMERICAN TRUCKING ASSOCIATIONS, INC.

THOMAS J. DONOHUE
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November 30, 1987

Senator Quentin N. Burdick
Chairman
Committee on Environment and Public Works
United States Senate
Washington, DC 20510-6175

Dear Senator Burdick:

Enclosed are responses to the three questions which you raised following the infrastructure hearing. I am pleased to provide ATA's views on each of these important issues.

The Nation's infrastructure is clearly a matter of national concern today and the trucking industry as a major supporter of the highway infrastructure has a major stake in the issues involved.

Thank you for the continuing effort of your committee to deal with this important issue.

Sincerely,

Tom

/cm

Enclosure

Reply to Questions Posed by Senator Quentin N. Burdick

To Tom Donohue

1. What do you think is the single most effective and feasible action Congress could take to strengthen the infrastructure of our Nation?

   The single most effective short term action which could be taken to strengthen our Nation's infrastructure would be to enact legislation to spend the large balances currently existing in the Federal Highway and Transit Trust Funds as well as the Airport and Airways Trust Fund. Releasing these trust fund balances for actual expenditure on the Nation's transportation infrastructure could solve many serious congestion problems by added expenditure of nearly $20 billion on new transportation facilities. For the longer term, taking the transportation trust funds out of the federal budget and establishing other separate trust funds for water treatment, waste disposal and other infrastructure needs, to be paid for from special user funds or general revenues, could provide a great deal more support for a national infrastructure program.

2. At the request of Congress, the Transportation Research Board is doing a comprehensive study of several major trucking issues, including the so-called "reasonable access" issue.

   Is the ATA working with the Transportation Research Board as it proceeds with this important study?

   ATA has offered its support to the Transportation Research Board concerning this study, but members have not yet been named and the study will not begin until some time in 1988. Once the study begins, the Congressional directive provides for a final report within thirty months. The trucking industry has been paying the increased taxes imposed by the Surface Transportation Assistance Act (STAA) of 1982 for nearly five years, but the benefits promised from increased productivity have remained severely restricted. In several key states operation of the STAA authorized vehicles to major shippers and even to whole areas in the state is not possible. Every day carriers are being arrested for inadvertantly operating STAA authorized combinations on prohibited routes in the process of making pickups or deliveries from shippers who had ordered such service. No evidence has been presented that these units are any less safe than the semitrailers which they replaced. The trucking industry simply cannot understand why it is now proposed that nothing be done to improve access for these more productive highway combinations for another two years or more.

3. The Federal Highway Administration and many of the states are conducting new or updated cost allocation studies.

   Does ATA support basing highway user taxes on the costs each vehicle class imposes on the highway system?

   ATA has supported basing highway user taxes on highway costs generated by various vehicle classes for more than forty years. The current federal and state highway user tax system imposing fuel taxes and various other fees has been designed to collect user taxes on that basis. The disagreement has been over the methods of conducting cost allocation studies and the railroad inspired arguments that only weight distance taxes can achieve tax equity. ATA long supported the incremental method of highway cost allocation which has now been abandoned by the Federal Highway Administration and by the states. The incremental is a "cost occasioned" procedure with agreed upon rules. Since 1982 state cost allocation studies have not been conducted under any consistant cost allocation theory and as a consequence there has been tremendous variability in the conclusions of recent state studies. There is today no consistant agreed upon method for determining highway costs by vehicle classes. Determination of the factors which actually cause pavement damage and pavement wear is one of the major components of the Strategic Highway Research Program now getting underway with extensive Federal Highway Administration funding. If the Congress wishes to consider reallocation of the federal highway user tax structure, it should await the findings of the Strategic Highway Research Program pavement studies.

THE AMERICAN INSTITUTE OF ARCHITECTS

STATEMENT OF

TED P. PAPPAS, FAIA

ON BEHALF OF

THE AMERICAN INSTITUTE OF ARCHITECTS

BEFORE THE

U.S. SENATE SUBCOMMITTEE ON
WATER RESOURCES, TRANSPORTATION, AND
INFRASTRUCTURE

OF THE

U.S. SENATE COMMITTEE ON

ENVIRONMENT AND PUBLIC WORKS

OCTOBER 6, 1987

Mr. Chairman and members of the Subcommittee, my name is Ted P. Pappas, FAIA, First Vice-President of the American Institute of Architects and a principal in the firm of Pappas Associates Architects, Inc. in Jacksonville, FL.

I am pleased to represent the AIA at this important hearing to explore the condition and needs of the nation's infrastructure network, and the role of government and the private sector in meeting those needs.

The AIA is 130 years young, with more than 50,000 members, and is the professional association representing the nation's architects. The AIA is also a member of the steering committee of the Rebuild America Coalition, whose President, John Horsley, you heard from earlier today.

Before I begin my formal testimony I would like to express the AIA's deep appreciation for your leadership in this critical area of national concern, and recognize your continuing commitment and contributions to the betterment of the built environment. The AIA was pleased to work with you and your staff in the passage of the legislation creating the National Council on Public Works Improvement, and we look forward to working with you as your Subcommittee fashions future legislation aimed at improving the nation's infrastructure.

Today, I would like to provide the Subcommittee with perspectives on the issue of infrastructure that have not received sufficient attention in the public discussion. Other witnesses have and will provide more than ample descriptions of the deplorable state of much of the infrastructure in this country, the declining share of public expenditures that go for capital investment, and the amount of funds that this nation will need to contribute from a variety of sources if its public works are to serve with reasonable efficiency. We concur with these views and hope that you will pay close attention to them. At the same time, the AIA supports the legislative goals of the Rebuild America Coalition:

1. A halt to any further funding reductions in Federal infrastructure improvement efforts;

2. The release of funds sitting in the highway and airport trust funds;

3. An end to federal restrictions on use of tax-exempt financing for infrastructure purposes;

4. Creation of a federal capital investment program aimed at states' and localities' infrastructure needs; and

5. Establishment of a federal capital budget.

We hope you will endorse these goals.

My remarks today will focus on several other topics: the role of the architect in creating public works facilities, the definition of infrastructure, capital improvement and land use planning, competitiveness, and the government process for procuring architectural and engineering services.

The Architect's Role

The architect is a central figure in the infrastructure maintenance and construction process.

Architects across the country are prepared, by reason of their training and skill, to help solve the problem of finding ways to rebuild the nation's infrastructure and ensure that all of its parts relate to each other in ways that most efficiently and effectively meet human needs.

America's architects recognize the vital importance of the role of the infrastructure in a well-designed, well functioning environment. This is certainly true regarding public buildings--ranging from city halls to police stations to community hospitals to public schools. But the architect's concern extends far beyond buildings. The architect sees the infrastructure as part of the total community environment, which if permitted to deteriorate at its current pace threatens to jeopardize the quality of American life.

The Definition of Infrastructure

As we read studies on infrastructure needs, it becomes immediately apparent that the nation's infrastructure is composed of elements as varied as the man-made environment. These elements form a network of man-made structures that serve important public purposes, from national security to economic prosperity, from communications to enhancement of the environment. Some widely read and quoted studies, such as Hard Choices, prepared by the Joint Economic Committee in 1984, focus on several elements of the infrastructure, to the neglect of others. Some observers have mistakenly defined the limits of those studies as the limits of infrastructure need and concern. We believe that the definition of infrastructure must be broader and more inclusive.· Specifically, we urge that any future legislation recognize the place of various public buildings in the infrastructure network. Such structures as warehouses, laboratories, equipment repair shops, and emergency services facilities as well as administrative offices, courthouses, and educational facilities provide very important and very different support for other infrastructure elements, whether they involve highways or waterways, airports or deep water ports. Flexibility for states and localities to determine their own infrastructure needs and solutions is essential to a successfully integrated, comprehensive infrastructure program.

Capital Improvement and Comprehensive Planning

Federal infrastructure policy should encourage state and local land use planning and both short-term and long-term capital improvement plans. Given the enormous needs and the severe limitations on available resources, it makes sense to consider and provide the maintenance, improvement, and new construction of public works in a timely fashion according to a carefully determined set of priorities. While decisions related to the various elements of the nation's infrastructure must of course take into account need and function, benefit and cost, they must also include the way each element of the infrastructure relates to all structures and forces within the total environment. The creation of a quality human environment depends on the skillful and well-planned integration of all those elements, none of which can be permitted to break down without impairing and imperiling the entire community.

A survey conducted jointly several years ago by the U.S. Conference of Mayors and the National League of Cities found that of 809 cities questioned, over 90 percent "reported that they either have a capital budgeting process or a substitute which accomplishes the same purpose." Federal legislation should also amend federal budget law and procedures to establish a federal capital budget so that assets will not continue to be treated as liabilities and so that we have a much more accurate picture of the federal budget. The Congress considered this issue in 1984, but declined to pursue it. Although the development of a capital budget will hang on the decisions about what to include, this hurdle can be overcome.

Competitiveness and Research and Development

Infrastructure is an important factor in the nation's ability to compete in the world marketplace. The smooth flow of goods across the country and out of the country depends on modern transportation and support systems, which include roads, bridges, ports, harbors, airports, and other facilities. Lost time is lost money and lost opportunity.

The Federal Highway Administration calculated that deteriorating highway conditions increased the cost of using the nation's roads by $68.98 billion from 1981 to 1983 as measured by both travel time and the cost of transporting goods and services. But infrastructure is also important as a means to compete on the domestic market against imports. Effective water resources, sewer systems and solid waste facilities are but a few examples of what is needed to enhance the capacity of domestic companies to compete with imports that do not face the same constraints when it comes to infrastructure support. Obviously if this nation wishes to compete effectively, it is necessary to improve the efficiency, usefulness, and durability of the structures and systems we create. Research and development concerning construction materials, building components and the design process should be a high priority. It is not. U.S. research expenditures in energy conservation, for example, have declined dramatically over the last six years, from $1.21 billion in FY1979 to $311 million in FY1987. And our progress in development of more energy efficient, and therefore less costly buildings, has been slowed. The U.S. actually spends no more on the research of buildings than it does on as razor blade research.

Federal Procurement of A/E Services

Most infrastructure is government funded in full or in part because its purpose is public. Procurement of architectural and engineering services for creation of facilities is therefore an important government function. The public interest is best served by a procurement process that ensures the best designers from a functional, aesthetic, and safety standpoint.

Federal procurement is governed by the Brooks act (Public Law 92-582). Many states have adopted mini-Brooks Acts. This Act requires that qualifications will be the starting point for procurement of architectural and engineering services on federal projects covered by the Act. And that's the way it should be, for the architect and the engineer create a product unique to each problem, and no architect or engineer solves the same design problem in precisely the same way. Twenty-nine states have laws specifying Brooks Act procedures for selection of architects and engineers, and the majority of the other states also follow Brooks procedures by administrative regulation.

In 1985 the AIA completed a comparative study of two states' architect/engineer selection systems. The study showed conclusively that the Brooks Act procurement system used in Florida was only half as expensive and took only half the time of the price-based system used in the state of Maryland. Maryland, which was the only state to require by law the use of price as a primary factor in selection of architects and engineers, has since passed legislation changing its procurement system to a Brooks-type process.

The qualifications-based selection process is also recommended by the American Bar Association's Model Procurement code for State and Local Governments. The AIA therefore strongly supports continuance of the Brooks Act as the means of procuring federal A/E services.

I would like to close by emphasizing that the federal government must be a fully involved partner in improving our infrastructure. The national interest in better public works facilities is clear, and so is the federal responsibility to provide its fair share of the resources necessary to do the job. It won't be cheap, but it will be more costly for the quality of American life if any one of the partners, whether its the federal government, the private sector, or any other level of government fails to hold up its end of the bargain.

This Subcommittee has embarked on an important journey. We look forward to taking it with you.

William Miller
Manager
Denver Colorado Water Dept.
1600 W. 12th Avenue
Denver, CO 80254

Representing American Water
Works Association

AWWA REPRESENTATIVE
6 OCTOBER 1987 TESTIMONY
ON
WATER SUPPLY INFRASTRUCTURE
TO
SENATE SUBCOMMITTEE ON WATER RESOURCES, TRANSPORTATION AND INFRASTRUCTURE

Good morning (afternoon) Mr. Chairman, I'm Bill Miller, Manager of the Denver Colorado Water Department. The Denver Water Department supplies an average of 205 million gallons of potable water a dav to some 880,000 people. The Department is a member of the American Water Works Association. I am a past-chairman of AWWA's Water Utilitv Council and incoming chairman of its Management Division.

The AWWA appreciates this opportunitv to be a part of vour deliberations on the critical issue of funding for Water Supplv Infrastructure. The AWWA is a 106-vear-old scientific and educational association which is the largest association of professional drinking water people in the world. We have over 43,000 members which include utilitv operators, engineers, contractors, scientists, professors, health regulators, environmentalists and manv others that have a genuine interest in drinking water. Our membership also includes over 3,000 utilities which supplv about 70 percent of the nation's drinking water.

Prior to 1918 the water svstem serving the Citv of Denver was owned and operated bv private companies for almost half a centurv. In 1918, the Citv purchased the water svstem. The Charter of the Citv established the five member non-political Board of Water Commissioners and vested within that Board the complete charge and control of the City's water system and plant. Members are appointed by the Mayor of Denver for six year overlapping terms. Each is paid $25.00 a meeting, the Board must hold two regular public meetings each month at which time all policy matters are decided, with compensation limited to a maximum of $600.00 per year, but a deduction made of $25.00 for each meeting a member fails to attend.

The Denver Water Department is currently serving a population (both inside and outside the city, treated and raw water) of approximately 1,002,000 people. The presently developed firm annual raw water yield is 295,000 acre feet. (One acre foot equals 325,860 gallons.)

Denver proper has a population of 500,000. The balance of the people served by Denver live outside the corporate boundaries of the City and are served by the Department through a series of contracts with cities and special purpose districts. The Department has a total of 95 contracts of three general varieties: full service agreements in which we provide the same service to those entities as to the people of Denver, including all maintenance of the system, reading of meters and billing; read and bill contracts in which the entity or city served by contract has the responsibility of maintenance of the system but Denver reads meters, sends out bills and collects funds for the particular district; and master meter contracts in which Denver merely wholesales water to a district or city and that entity then installs and maintains its own distribution system, does its own meter reading, billing, etc.

The Board has entered in a Metropolitan Water Development Agreement with 46 suburban, municipal or quasi-municipal entities located within the metropolitan area of Denver whereby capital costs of new supply facilities will be shared by those suburban entities benefiting from such projects.

The Denver Water Department has 1,010 employees and its 1987 budget calls for an expenditure of $120.9 million with operation ad maintenance expenditures at $43.9 million and capital expenditures budgeted at $48.6 million. Debt reduction of $27.6 million and miscellaneous other expenditures accounts for the balance.

These budgeted expenditures exceed 1987 projected receipts of $115.4 million which would indicate an unbalanced budget. However, we started the budget year of 1987 with a balance of $117.4 million and will reduce that balance by the $5.4 million so as to have a balanced budget as required by our Charter. We maintain cash reserves for the following purposes: (1) to cover debt service for one year; (2) for ordinary operating and capital reserves; (3) reserves for future capital development and (4) provisions for insurance potential claims and contingencies.

I am particulary delighted to be here today since the AWWA Water Utility Council has long been debating the issues of Infrastructure problems and how water companies, big and small, will finance capital construction, restorations and upgrades that will be driven by a whole host of new laws and regulations.

Before we get into the problems and funding issues, let me give you a brief profile of what I'll call the drinking water industry - a component of the broader drinking water community. The best data we have indicates there are about 210,000 total water supplies in the country that actually get water into the home; while some estimates indicate there may be as many as 6 million Americans who don't have piped in water. Of the total water supplies, current laws and regulations only deal with the 59,000 public water systems which serve about 220 million Americans. Quality requirements are driven by the large and very large water systems which represent 5 percent of the systems yet serve over 71 percent of the population. These large and very large systems have 81 percent public ownership and some 60 percent use surface water sources.

However, ownership and source are NOT the significant issues since large privately owned utilities also have a strong voice in quality requirements. Utility size is the significant issue.

The total water supply system profile dramatically emphasizes the size issue, being skewed by 38,000 systems that serve less than 500 population each - many of which are not financially viable and roughly 90 percent of which use ground water sources. But we should always remember that these very small systems, which represent 65 percent of all community systems, only serve about 2 percent of the population.

Now I think we need to look at the condition of our water supply systems nationwide. Quantity wise there are many estimates which predict a disasterous shortage of water over parts of the country in the coming years - I think it is sufficient to simply state that there will be regional requirements for new sources. There may also be some shift in source water type; although most systems now use ground water the vast majority (some 68 percent) of the population, like Denver, is served by surface water. New water demands are most likely to be served from ground water since population growth is projected in ground water areas. We have learned, however, that ground water is not immune to contamination. As a matter fo fact, preventing pollution of underground water supplies is a major challenge facing the drinking water community.

Our water treatment and distribution systems vary greatly in type and operation and most financing is locally controlled, thus conditions fall into a wide range. In the East where distribution systems have been in existence for hundreds of years (wooden pipe distribution was documented in Albany, New York in 1686) there is critical need for distribution system restoration, while the Southwest has little immediate need in that area. Treatment facilities upgrade and restoration is needed in many parts of the nation because of the 1986 Safe Drinking Water Act and regulations that will follow. Some of the very large water utilities have already upgraded, or are now upgrading, but generally there is a staggering requirement coming in this regard. As an example, Denver has an excellent laboratory, but we are in the process of completing a $1 million addition to the lab to give us the capability of handling the increased testing for a wide variety of possible contaminants.

There are many different sources for estimates of Infrastructure requirements in the drinking water industry. Most of these estimates are very rough and tend to be general in nature. Estimates are somewhat fuzzy in the short term and are probably unrealistic in the long term, but keeping our estimates in the 1990 time frame does give us order of magnitude figures. The Association of General Contractors and the Congressional Budget Office say capital investment shortfalls for drinking water run about $7 billion per year, while the Joint Economic Committee of Congress puts the shortfall at $9 billion. The National Council on Public Works Improvement is currently trying to lock in on a better figure.

Nailing down good numbers is complicated by the fact that water utilities are very independent entities with efforts only recently being made to consolidate basic inventory and cost data on a national basis.

AWWA's available survey data can be extrapolated to reflect a current industry funding projection of roughly $4 billion per year, broken down as:

- 19% for Preventing Water Source Degradation
- 6% for Pumping Facilities
- 20% for Treatment Facilities
- 43% for Distribution Systems (Restoration)
- 6% for Storage Restoration
- 6% for General Property

It is important to emphasize that the average annual requirement will likely be somewhere between $5 and $10 billion, but there will be a big surge in capital improvements over the next few years driven by the Safe Drinking Water Act and related environmental statutes. This average requirement is also skewed by the performance of the thousands of very small systems that are chronic violators of existing drinking water standards. In 1980, EPA reported it would cost $1.2 billion to bring small systems into compliance and that figure will go up significantly under future regulations.

The real impact will be on the individual consumer or, more accurately, rate payers. AWWA's data bank indicates that the average rate being paid for water is about $1.25 per 1,000 gallons, but the range is from roughly $0.10 to $21.00 per 1,000 gallons. Almost all rates will have to go up, in some cases substantially (gaining small system compliance today will cost some $6.00/1,000 gallons), depending on what the various water supply scenario is - that is: what is in the raw water; how you will treat the raw water; and, to what level you will remove contaminants. It is extremely misleading to generalize, but let me do so to simply illustrate the possible impact on a medium water supply serving 10,000 population. If the raw water source is groundwater, new treatment for volatile organics may be required - this could cost an additional $0.50 per thousand gallons. Also, disinfection or modified disinfection, could be mandated at a conservative cost of $0.10 per 1,000 gallons, and use of granular activated carbon treatment could be required for a whole series of removals from some pesticides or synthetic organics to disinfection by-products at a very rough cost of $0.40 per 1,000 gallons. I must also qualify this estimate for disinfection by-product removal by stating that it is a reasonable estimate for a reasonable reduction in the disinfection by-product standard, a significant reduction in the standards (say to 20 parts per billion Total Trihalomethanes) could drive rates up many times above this estimate. This simplified estimate quickly adds $1.00 per 1,000 gallons to the consumer's cost or a very rough figure of $100 per year. If a surface water source is used, the costs could be much higher since filtration alone can cost roughly an additional $0.90 per 1,000 gallons, if it is a new requirement in the treatment train. Other treatment can add significantly to our ever increasing rate example as will elimination of any backlog of deferred maintenance and restoration.

Despite these increasing rates, our surveys indicate that the vast majority of the public will pay for high quality water - provided they understand why and are involved in the decision. As a matter of fact, there are many regional systems in rural areas that already pay "rates" well above the range I've quoted.

I have talked here about water rates because that's how drinking water infrastructure requirements must ultimately be financed. Certainly up-front capital for major restorations and upgrades can be obtained from several sources, i.e., Industrial Development Bonds, Revenue and General Obligation Bonds, grants, loans, accummulated revenues, etc. However, the final payment must all come from the rate structure of utilities. Because of the unique nature of our tax structure and restrictions imposed, rates of privately (or investor) owned utilities tend to be higher than publicly owned utilities since all their expenditures must be covered by revenues produced from rates, whereas some public utilities may share costs with other public entities. Privately owned utilities tend to set real rates based on water production over the long term and have a major difference with public utilities on taxes. For the larger utilities, rate increases that will come can be easily absorbed because of the wide customer base that exists, but the very small utilities serving 500 populations and less are quite another case. These type utilities which are predominantly privately owned (i.e. trailerparks, small developments, etc.) find it extremely difficult to raise capital and even if they do, their amortization periods are usually very short, making repayment difficult. Even some much larger utilities, both private and public, are faced with this difficulty because of poor credit ratings or other reasons. Yes, there are grants and loans available through Farmers Home and other federal programs, but they are tough to get and have been declining for years. Most federal programs insist that systems receiving loans or grants be financially sound. All indications are that the thousands of small systems in violation of drinking water standards are not financially sound.

Some states have realized the significance of this issue and have established or are establishing revolving infrastructure funds. This idea is also getting a shot in the arm from the federal construction grants program transition to a loan program in the 1987 Water Quality Act. At State level, the Commonwealth of Pennsylvania's Water Facilities Restorations Act sets up an independent water loan program; this concept deserves a closer look by other states.

The water industry and AWWA have not relied on any federal grants program to get things done; we believe that high quality drinking water is a product that should be paid for through a realistic rate structure. We further believe that drinking water revenues should be restricted to drinking water use and not be used to fund other forms of infrastructure. However, we understand the unique financial problems of some utilities, especially the very small utilities, thus we do support the formation of state revolving funds for water infrastructure requirements along with general infrastructure requirements for utilities both public and private. The states should have the flexibility to control these funds and vary both interest rates and amortization periods. The states should also have access to federal seed money for these infrastructure banks - perhaps this seed money could come from the many fragmented federal sources that exist today, such as the Farmer's Home Administration (FHA), Department of Housing and Urban Development (HUD), the Economic Development Administration (EDA), and the Appalachian Regional Commission (ARC) as well as some special programs internal to the Environmental Protection Agency. We have discussed this possibility previously with the Congressional Budget Office and would be happy to assist their staff or yours in any investigation of the many options that should be considered. Any state revolving fund program of this type must also anticipate the situation of loan delinquency. We recognize that many of the very small utilities that exist today cannot financially survive, thus we strongly advocate regionalization wherever possible, either through private systems or public systems, whichever is prudent. But if regionalization doesn't happen and a loan becomes deliquent, then the state should acquire the bankrupt or defunct utilitv and negotiate regionalization with a financiallv viable utilitv that can use the additional rate base to its advantage while assuring water of unquestionable qualitv. Perhaps this condition, or a similar one, could be made part of the qualification requirements for federal seed monev along with restricting the use of utilitv revenues to that utilitv, i.e., water revenues for water costs including amortizing loans from a revolving fund. AWWA emphasizes that states must take positive action to control the proliferation of small drinking water svstems that are not viable and thus provide poor qualitv water. Strong control through such processes as construction and operating permits, long-range planning and the use of institutional alternatives (i.e., satellites, water districts, countv setups, privatization, etc.) will help.

If we are going to provide drinking water of unquestionable qualitv in the future, we must all do a better job of forecasting our needs, developing innovative funding mechanisms and educating the public so thev can make the right choices.

AWWA and I appreciate this opportunitv to present our views - we hope thev are helpful to vou in vour consideration of this issue - an issue which won't go awav and won't get anv better with time.

I'd be happv to answer questions on our general comments or mv specific utilitv situation if vou desire.

American Water Works Association

November 4, 1987

The Honorable Quentin N. Burdick
Chairman, Committee on Environment
and Public Works
United States Senate
Washington, DC 20510-6175

Dear Chairman Burdick:

Since the prepared statement of Mr. William Miller and many of his remarks were official statements from the American Water Works Association (AWWA), we are taking the liberty of commenting on your attached questions for Mr. Miller.

As our comments will imply, we believe that the impact of the '86 Safe Drinking Water Act and many other recent laws will be significant on the infrastructure of local communities, including drinking water infrastructure. That impact in terms of funding required will be particularly acute for the small communities and that's where the assistance of Congress is called for.

Over the past several months we have been working with your staff whenever or wherever we can help and we continue to offer that assistance.

We thank you for your foresight on this issue and the open mind of your staff.

Sincerely,

John H. Sullivan
Deputy Executive Director
Government Affairs Office

JHS/mel
Enclosure

cc: William H. Miller

GOVERNMENT AFFAIRS OFFICE 1010 Vermont Ave N W Suite 810, Washington, D C 20005 (202) 628-8303

Committee Questions with AWWA Comments

Question: What do you think is the single most effective and feasible action Congress could take to strengthen the infrastructure of our nation?

Comment: AWWA believes there are several related issues that Congress can influence. We believe that most public infrastructure should be financed through a user fee type structure, e.g., highway taxes on gasoline for highways, sewerage rates for sewer systems, water rates for water systems, etc. These user fee type structures which are used to pay debt service should be assisted by the ready availability of up front funds for capital investment and Congress can assist in this availability through insuring proper tax credits, working out the hindrances in the bond market, providing mechanism for federal seed money for state controlled revolving loan programs and other related items. In these critical times of budget deficits, Congress shouldn't be considering a new massive federal funding program.

Question: There are cost estimates of from $7 billion to $9 billion per year to bring our drinking water into compliance with the Safe Drinking Water Act Amendments, in addition to new requirements most cities and towns will face for treatment under the Clean Water Act Amendments. Your testimony mentions the impact of these costs on the 38,000 small systems that serve communities of 500 people or less. Of course, many of these systems are in rural areas.

Please expand on how much of a hardship this will be on rural areas, some of which are also depressed due to agricultural conditions.

Comment: In our testimony we used a very rough estimate of total cost to the nation for complying with the new Safe Drinking Water Act quality requirements, correcting all the deferred maintenance and upgrading to meet quantity requirements. This estimate was about $10 billion per year in capital investments. We also indicated the nation was currently spending about $4 billion per year on drinking water capital investment - thus we're "disinvesting" at a rather high rate (even if the estimates are not exact). Much of this estimated annual requirement will fall on the thousands of small utilities which will require new treatment facilities to insure their consumers obtain the same quality water as the rest of the nation. The water rates required of these small system consumers will have to be increased substantially to pay the debt service for capital investment loans, if capital investment funds can even be obtained. Exactly how much these rates will go up is very site specific and will vary greatly community by community. Even with regionalization, privatization, annexation, or other economizing measures, the cost per family will go up significantly - raising the tough question of affordability in some communities. We in AWWA would caution that affordability should not be used as a way out of compliance with water quality standards - we want the same high drinking water quality standards for all our citizens! With uniform standards, we simply need to help those that need help in paying the price for meeting these standards.

Question: You support creation of state revolving loan funds for water infrastructure development, patterned along the lines of the Clean Water Act. As you are aware, the Committee is working on federal legislation in this area. One of our concerns is in designing a bill to aid those systems which really need help - not to reward systems that have been poorly managed.

Do you have any thoughts on safeguards we could put in legislation to accomplish these ends?

Comment: We have been communicating with your Committee staff and others for some time regarding federal legislation to help the small water utilities in this nation and to insure that once drinking water quality standards are set, all our citizens are assured of obtaining drinking water meeting those standards. On 25 September 1987 we sent your staff a detailed review of your draft legislative package and have had several discussions with various staff members since that time. We generally think your draft bill is a step in the right direction, but we also think it needs some refinement. These revolving funds must be state controlled and assist those that need it. The state funds should have flexibility to grow from levered federal seed money and that seed money should be allocated by an experienced federal agency. The states must also be directed into a role with some teeth in it; we cannot afford to have citizens who do not get good quality or adequate drinking water. We also believe that proper research is a related but separate issue that should not be linked to this proposed legislation. Insurance of adequate drinking water of unquestionable quality to all citizens at a cost they can "afford" to pay will take some tough decisions by the states regarding who supplies water at what costs, etc. Assisting our utilities that need and deserve assistance will also take some source of revenue for distribution to the states - all revenue options should be looked at with an open mind and a realistic view.

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STATEMENT OF

MS. BETTY ANN KANE

COUNCILMEMBER, WASHINGTON, D.C.

on behalf of

THE NATIONAL LEAGUE OF CITIES

on

THE NATION'S INFRASTRUCTURE NEEDS

before the

SUBCOMMITTEE ON WATER RESOURCES, TRANSPORTATION,

AND INFRASTRUCTURE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

UNITED STATE SENATE

October 6, 1987

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STATEMENT
OF
MS. BETTY ANN KANE, COUNCILMEMBER, WASHINGTON, D.C.
ON BEHALF OF
THE NATIONAL LEAGUE OF CITIES

October 6, 1987

Mr. Chairman, members of the Subcommittee. I am Betty Ann Kane, Councilmember from Washington, D.C. and a member of the National League of Cities Transportation and Communications Steering Committee. I am here today to testify on behalf of NLC and 16,000 cities and towns we represent on local government's ability to finance and maintain our local infrastructure.

You have heard already this morning the grim statistics of deterioration. Nearly one third of all municipalities believe that current public infrastructure systems pose a serious threat to the health and safety of their citizens. Sixty percent expect to double municipal expenditures for infrastructure over the next 5 years. Twenty-four percent expect to triple such spending.

Among NLC's own membership, a 1986 research report found that cities and towns are unlikely to maintain current spending levels for public works if further reductions occur in federal funding. The study was done before the revenue sharing program was terminated. Even though the study found that three out of every four local officials believed that their city's capital spending was considerably lower than it ought to be, constraints on local capital spending make it unlikely that cities will alter their financial commitment to infrastructure.

Unfortunately at the same time that infrastructure needs continue to grow and the push for competitiveness escalates across America, the federal government has instituted fiscal policies which have diminished the ability of cities to pay and plan for local infrastructure needs. Changes in the tax code have reduced our ability to finance basic infrastructure needs and to direct industrial growth. The loss of federal assistance, most significantly General Revenue Sharing, has had a devasting impact on cities already in fiscal distress. Our cities' housing stock continues to deteriorate and waiting lists for public housing get longer. I would like to address these issues in my testimony this morning.

The question for municipal officials is how to finance these public needs - especially at a time when the federal government is not only abandoning its partnership, but is undercutting our own ability to meet these needs ourselves.

We believe, Mr. Chairman, there are four critical contributions the federal government must take: First, there must be some form of targeted fiscal assistance for the nation's cities and towns in the greatest fiscal distress. Second, federal taxes paid into trust funds for public infrastructure purposes must not be artificially withheld. Third, we cannot afford to waste the nation's capital investment in low income housing. And fourth, the federal tax code and IRS regulations must be reformed and simplified so as not to discourage, tax, or penalize public capital investments in the nation's infrastructure.

The Loss of General Revenue Sharing

For cities large and small, the loss of General Revenue Sharing has compounded a problem of uneven economic health across our nation. The loss of revenue sharing marked a 25 percent reduction in direct federal aid to municipal governments. For most smaller communities, revenue sharing was the only form of federal support they ever saw.

Over fifty two percent of cities responding to NLC's annual survey of city fiscal conditions reported they were cutting back expenditures on capital projects this year. The level of capital spending is a measure of city's ability to maintain and rebuild and improve its physical stock of roads, bridges, public buildings and other facilities. Forty-four percent cited the loss of revenue sharing as a major factor in reducing capital expenditures.

For small cities and towns, the loss comes at a particularly difficult time. In our recently completed survey of some 395 smaller cities and towns, 32 percent reported that the state of their streets, roads, and sidewalks had worsened. This deterioration occured before the loss of GRS; yet, more than half of these municipalities used between 75-100 percent of revenue sharing funds on such projects. Indeed, 51 percent responded that they will cut back on funding for streets and roads in post-GRS municipal budgets.

Nevertheless, local governments are doing what they can to raise revenue themselves to finance local needs. But many states' tax policies restrict the ability of municipalities to levy taxes. State law limits the property tax in three out of four cities responding to the NLC survey. Nearly half of that group responding said they are at the property tax limit. Many more are close to it. Among communities with access to the sales tax, two thirds said they are limited, and 80 percent said they were at their limit.

For municipalities, most of the quick solutions -- capital cutbacks, new fees, hiring freezes and contracting out -- have been stretched to the limit. These communities are in no position to spend money that's not there on maintaining public roads and facilities. The crucial maintenance and investment decisions are being left for better times.

Our survey shows that there will be a greater reliance upon general obligation municipal bonds to finance public infrastructure in the absence of a federal role. But I want to emphasize, Mr. Chairman, that the termination of revenue sharing has a related adverse impact.

Because revenue sharing was provided on a formula based upon fiscal distress, it helped to balance credit ratings. The loss of revenue sharing means that those municipalities in the greatest fiscal distress will lose the greatest amounts of funds - losses which will result in lowered credit ratings. Lowered credit ratings, in turn, translate into significantly higher borrowing costs. It is the old American truth: the rich get richer, and the poor get poorer.

Senators Durenberger, Sasser, and Heinz have all proposed legislation to create a targeted fiscal assistance program. We believe such a program is critical if we are not to leave many of our cities and towns behind.

Changes in the Tax Laws

While the new tax law was supposed to simplify the federal tax code for some, it has done exactly the opposite for the nation's cities and towns. More than a year after the new law's retroactive date of initiation, the Treasury still has not issued any of the key regulations for municipal debt issuance. Footnotes in the "Blue Book" which go well beyond the new law itself have further added to uncertainty.

The definitional changes on what constitutes a municipal "governmental purpose", the restrictions on arbitrage earnings -- including municipal property and income taxes used in a reserve or sinking fund -- the alternative minimum tax, and the rebate requirement have all had a detrimental impact on cities' capital and debt policies. Cities have sharply reduced new tax-exempt debt issuance this year.

In our current survey on tax reform's impact on city finances, we have learned that nearly three-fourths of all municipalities have altered their capital and debt policies. Such changes are in a legal "twilight zone," however, awaiting regulations from the IRS.

Most of our members have had to change their debt policies to determine whether they may comply with the new 10 percent rule. While we know that not a single municipally owned and operated airport in the nation is defined under the new law as a "governmental purpose" facility, we are finding an increasing number of municipal wastewater treatment plants, streets, and other capital facilities which similarly fail the test.

Our survey has already found that virtually all cities have experienced a significant increase in administrative costs and paperwork to comply with the new law. This has both reduced the ability to issue as reduced the amount of capital actually available for public investment. We anticipate that if and when the Treasury issues new arbitrage and rebate regulations, our costs of compliance wil escalate significantly.

Finally, the imposition of a federal "minimum" tax on all municipal "governmental purpose" bonds has created what a member of the House Ways and Means Committee staff called the "Chernobyl" effect. It has put a cloud over all debt issuance for public infrastructure. That cloud means we must pay higher interest costs to sell our bonds. Higher interest costs mean we get less infrastructure investment but more local taxes.

For us, it means the federal government - for the first time in its history - has placed a tax on state and municipal governments.

In a related development, we note the request by the administration to subject municipal vehicles to the federal gas, excise, and annual use taxes. This request, incorporated in the Joint Tax Committee package for the Finance and Ways & Means Committee, would constitute a direct tax on essential municipal activities. We would very much hope, Mr. Chairman, that given your profound scholarship and leadership on federalism issues, you would take the lead in opposing this request.

We support efforts to revise those portions of the tax law which most undercut the concepts of reciprocal immunity, including eliminating both footnote 160 and 173 from the Blue Book.

Housing

Since the end of World War II, the United States has made an extraordinary investment in low income and public housing. In the past seven years, however, the federal government has made deeper disinvestments in low and moderate income housing than any other major domestic program. The 1986 tax bill likewise made significant changes with regard to incentives for capital investment in rental housing.

We are now on the edge of a precipice. The existing "pipeline" of housing will begin to run out in the next two years. Over the next decade, the nation is set for a "time bomb" as we face the loss of more than 3.5 million units of low income housing stock.

We believe that a solution to the housing crisis is critical to any federal poverty or infrastructure policy.

Mandates

As federal assistance for public infrastructure has declined, mandated municipal expenditures have increased. Such federal mandates adversely impact the nation's infrastructure by artificially directing capital investment.

For instance, while the new Clean Water Act phases out federal investment, EPA estimates that municipalities will have to spend $75 billion to comply with federal regulations over the next 12 years. Combined with the tax law changes, it is unclear where we will find these funds. It is clear that given our own limited revenue capacities, this federal mandate will force our hand with regard to our own limited capital pools.

We believe that if the federal government is going to mandate public capital investment, it ought to ensure the provision of resources to meet such requirements.

Release of Transportation Trust Fund Monies

Finally, we are concerned that those funds specifically created by the Congress for public infrastructure investment are not being fully utilized.

At least $15 billion in funds is currently available for spending on federal infrastructure programs. Balances in the Highway and Aviation Trust Funds continue to accumulate as critical infrastructure needs go unmet and the resultant surpluses are being used to offset the federal deficit.

We believe that this is an unjustified and unacceptable violation of the user fee concept of funding. The National League of Cities believes that federal transportation trust funds should be removed from the unified budget. Decisions on the appropriate level of funding ought to be made for transportation - not federal revenue - reasons.

Thank you very much for your interest and focus on this issue. I would be pleased to respond to any questions.

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United States Senate
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
WASHINGTON, DC 20510-6175

October 9, 1987

Mrs. Betty Ann Kane
City Council Member
District of Columbia
National League of Cities
6th Floor
1301 Pennsylvania Avenue, N.W.
Washington, D.C. 20004

Dear Mrs. Kane:

I want to thank you for testifying before the Subcommittee on Water Resources, Transportation, and Infrastructure at Tuesday's hearing on infrastructure needs. Your testimony was most helpful in providing a better understanding of the state of the nation's infrastructure and some very important related issues as well.

There was not sufficient time during the hearing, however, to cover the enclosed questions. For that reason, the Committee would appreciate receiving your replies in writing.

Please submit your answers as soon as possible, but no later than Friday, November 6, 1987.

Thank you very much for your cooperation in this matter.

With kind regards, I am

Sincerely yours,

Quentin N. Burdick
Chairman

1. What do you think is the single most effective and feasible action Congress could take to strengthen the infrastructure of our nation?

2. You spoke of a targeted fiscal assistance program for cities.

What factors would you suggest as important ones in such a program?

How would you measure distress?

Would a similar program be appropriate for distressed rural areas and small towns?

3. There is an infrastructure project for which both the District of Columbia and this Committee have a special concern: that is the Union Station renovation and expansion. Significant federal funds were made available to the District of Columbia to construct an adjacent parking garage, but there have been delays and other problems.

Can you tell us the status of the garage and the estimated completion date?

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November 12, 1987

The Honorable Quentin Burdick
Chairman
Committee on Environment and Public Works
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

Thank you for the opportunity to testify before the Environment and Public Works Committee and present the views of the National League of Cities on federal infrastructure programs and the difficulties which cities face in the meeting public works needs of their citizens. I apologize for the delay in responding to your follow-up questions.

Senator Moynihan had also asked that we provide some materials on issues that arose during our testimony. I have enclosed that information which includes: a study by Professor Michael Pagano entitled, "Tax Reform's Impact on City Finances: An Appraisal of Year 1;" a series of charts complied by the National League of Cities entitled, "Is Housing Our Citizens Still a National Goal?"; a June 1986 GAO Report entitled, "Rental Housing: Potential Reduction in the Privately Owned and Federally Assisted Inventory;" an article entitled, "Municipal Ratings Turn Negative," from the April 27, 1987 edition of *Standard and Poor's Creditweek*; a Touche Ross report entitled, "Privitization in America;" and an NLC Research Report entitled, "City Fiscal Conditions in 1987 and a listing of examples of the adverse impact of the new '10 percent' rule on the ability of cities to finance infrastructure."

In response to your specific questions on strengthening the infrastructure of our nation, a targeted fiscal assistance program for cities and towns and the status of the District's Union Station project, I am pleased to provide the following answers:

Past Presidents: **Tom Bradley,** Mayor, Los Angeles, California • **Ferd L. Harrison,** Mayor, Scotland Neck, North Carolina • **William H. Hudnut, III,** Mayor, Indianapolis, Indiana • **George Latimer,** Mayor, St. Paul, Minnesota • **Henry W. Maier,** Mayor, Milwaukee, Wisconsin • **Jessie M. Rattley,** Mayor, Newport News, Virginia • **John P. Rousakis,** Mayor, Savannah, Georgia • **Charles Royer,** Mayor, Seattle, Washington • **George V. Voinovich,** Mayor, Cleveland, Ohio • **Directors: Sidney J. Barthelemy,** Mayor, New Orleans, Louisiana • **Jose G. Benavides,** Council Member, Sterling Heights, Michigan • **Richard L. Berkley,** Mayor, Kansas City, Missouri • **Maria A. Berriozábal,** Councilwoman, San Antonio, Texas • **Bob Bolen,** Mayor, Fort Worth, Texas • **Scott A. Burgess,** Executive Director, Alaska Municipal League • **Jon C. Burrell,** Executive Director, Maryland Municipal League • **Mary Davis,** Councilmember, Atlanta, Georgia • **Eugene Cox Dunwody,** Council President, Macon, Georgia • **Stacey A. Garner,** Mayor, Pulaski, Tennessee • **W. Wilson Goode,** Mayor, Philadelphia, Pennsylvania • **E. Arthur Gray,** Mayor, Port Jervis, New York • **Alec Hansen,** Executive Director, Montana League of Cities and Towns • **Marian Humes,** Alderman, Chicago, Illinois • **Karen Humphrey,** Councilmember, Fresno, California • **Steven E. Jeffrey,** Executive Director, Vermont League of Cities and Towns • **Robert E. Johnson,** Executive Director, North Dakota League of Cities • **Joseph A. Leafe,** Mayor, Norfolk, Virginia • **Roland A. Luedtke,** Mayor, Lincoln, Nebraska • **Charles Lyons,** Chairman, Board of Selectmen, Arlington, Massachusetts • **Arthur E. Morris,** Mayor, Lancaster, Pennsylvania • **Bob Overstreet,** Councilmember, Everett, Washington • **Grace Petersen,** Mayor, Pierre, South Dakota • **Joy Picus,** Council Member, Los Angeles, California • **Dana G. Rinehart,** Mayor, Columbus, Ohio • **Steven C. Roberts,** Alderman, St. Louis, Missouri • **Joseph A. Sweat,** Executive Director, Tennessee Municipal League • **Dan D. Theobald,** Mayor, Shelbyville, Indiana • **James Weatherby,** Executive Director, Association of Idaho Cities • **Douglas S. Wright,** Mayor, Topeka, Kansas

1. Faced with the reality of severe budget constraints and the need to meet real human needs, the National League of Cities recommends that Congress not retreat from current federal programs that help cities meet infrastructure needs, refrain from imposing costly and unrealistic mandates which many cities are financially unable to meet and a change in the tax code which has severely restricted municipal bonding ability.

2. The National League of Cities strongly endorses enactment of a targeted fiscal assistance program for cities and towns which provides federal aid to fiscally distressed communities. Any future program should be more effectively targeted to aid only those communities facing severe fiscal constraints based on a formula with a per capita income cutoff for determining eligibility, the number of citizens actually in poverty, tax effort, fiscal capacity to respond on its own and some measure of unemployment.

The two targeted programs currently proposed in the Senate by Senators Sasser and Durenberger use a combination of these factors while screening out wealthier communities with a relatively high per capita income. NLC could only support such a program if it assisted small towns and rural communities since they have fewer resources available to respond to fiscal distress.

The need for a program of federal assistance among small cities and towns is strongly indicated by an NLC survey of small cities. The survey, released this past August, found two out of five communities faced an increase in small business failures and farm foreclosures and third indicating that unemployment was getting worse.

3. Although there have been many unforeseen delays, the City still plans to meet the September 1, 1988 deadline for completion of the Union Station parking garage.

The initial contractor was fired on June 19. The City has turned to the bonding agent, the Insurance Company of North America to replace the original contractor. A new contractor will be hired by either the Insurance Company of North America or the City within thirty days.

We greatly appreciate all the assistance the Committee has provided to the District on this important project.

If you have further questions that I have not answered, the District's Director of Public Works, John Touchstone (939-8000) or his assistant, Debra Price, Special Assistant for Capital Projects (939-8005) can provide you with details.

Once again, I thank you for the opportunity to testify before the Committee, the gracious reception given to me by Senator Moynihan and the Committee staff, and the chance to provide you with the background materials to enhance our testimony.

Sincerely,

Betty Ann Kane
Councilmember
District of Columbia

Enclosures

NOTE. The enclosures referred to have been retained in committee files.

TESTIMONY OF

ROBERT A. GEORGINE

PRESIDENT

BUILDING AND CONSTRUCTION TRADES DEPARTMENT, AFL-CIO

BEFORE THE

SENATE SUBCOMMITTEE ON WATER RESOURCES,

TRANSPORTATION AND INFRASTRUCTURE

OCTOBER 6, 1987

Mr. Chairman, members of the subcommittee, my name is Bob Georgine, and I am the president of the Building and Construction Trades Department, AFL-CIO. With 15 affiliated national and international unions, our organization represents, in the aggregate, approximately 4 million trade union members.

I am delighted to be here today to testify, and I would also like to compliment this subcommittee for bringing the issue of infrastructure to the attention of this Congress, and to the American people.

It is essential that this country be made aware of the basic network of facilities that drive this nation's economy -- our roads and highways; our bridges and dams; our mass transit systems; our water supply and waste water treatment systems. These facilities are in a severe state of deterioration and technological obsolescence. In addition, they are insufficient in capacity to serve future growth. This "infrastructure" represents the basic foundation and framework of the United States economy.

However, over the years there has been a monumental failure to provide the resources to adequately maintain and replace various aspects of this network. As a nation, the United States should be providing the resources necessary to phase out the obsolete and inefficient older facilities, while at the same time constructing newer and modern replacements. Of course, we have done some of this, but not nearly enough.

Left unchecked, this situation will only get worse. Many components of this system have begun to show the effects of aging, and some have approached or exceeded the "design lives" that were planned by engineers. Overlooked deterioration of outdated facilities can cause total construction and repair costs to rise substantially over the life-span of a facility.

Recently, we have been witness to catastrophic breakdowns in our infrastructure. The sudden collapse of heavily traveled bridges in New York and Connecticut along with the failure of a dam in Colorado claimed lives and caused millions of dollars in property damage. These incidents, and hundreds more that are not publicized, serve as a chilling reminder of the sad state of our physical foundation.

However, a dedicated effort on the part of federal, state, and local governments, along with both the public and private sectors, can result in a program that is both workable and relatively inexpensive.

The problem is definitely national in scope. It is certainly not confined to any specific region. Many people seem to think that the crumbling condition of this system is limited to the aging areas encompassed in the so-called "rust belt" of the northeast and Midwest. Certainly, these communities have indeed been extremely hard hit by the problems associated with crumbling and outmoded facilities, and the situation also threatens their opportunity for any type of long-term economic revitalization. But for many people in the rapidly growing areas of the south and southwest, the substantial gains in population are placing a strain on a public works system that is outdated and inadequate to represent the number of people it already serves.

Although the problems and reasons may differ, there is no disagreement over the fact that in state after state, the immediate and projected structural needs are quite substantial, and the gap between capital that is needed and capital that is being provided is increasing.

Some observers have noted that the costs of implementing the necessary programs could run as high as 3 trillion dollars! The overall assumption being that this nation has developed the most sophisticated and greatest network of roads, bridges, and waterworks in the world, but now suddenly is faced with the realization that it may not be able to maintain and/or improve such a system. With each passing year, the gap between needs and actual spending increases by billions of dollars.

Most experts seem to agree that, through the year 2000, the infrastructure gap between needs and outlays will total approximately 400 - 450 billion dollars.

However, as the gap widens, the level of federal spending on public works investment has diminished. Increased levels of inflation in the late 1970's, and high real interest rates in the 1980's have lent themselves to the postponement of needed spending while government investment expenditures have declined as a share of the economy.

A Congressional Budget Office (CBO) Report in 1986 showed that public works spending as a percentage of the Gross National Product (GNP) has steadily decreased since it's peak of 3.1 percent in 1968. It dropped down to 2.7 percent in 1980, and then fell even further to 2.4 percent in 1986.

In recent years, the enormous increases in the federal deficit has contributed to an increase in public works budget cuts. Struggling to apply damage control to the effects of the misguided economic policies of the Reagan Administration in the early 1980's, which included massive tax cuts combined with unprecedented increases in defense spending, the Congress has been forced to make cuts in a wide variety of federal programs, not excluding public works. According to the Congressional Budget Office (CBO), after rising 24 percent in the 1960's, and 46 percent in the 1970's, federal infrastructure outlays have declined by 13 percent from 1980 through 1985. Since 1983, the federal infrastructure gap has widened from a 4.3 billion dollar a year shortfall to a 7.5 billion dollar a year shortfall.

More than one half of this nation's existing two million miles of paved roads requires immediate attention and over one third of the Interstate Highway System is in critical need of repair. In addition to the needs of the roads and highways, bridges also pose a potentially grave problem. 45 percent of this nation's bridges have been labeled either deficient or obsolete. The Federal Highway Administration (FHA) estimates that in a large portion of states up to one third of the bridges require substantial renewal.

According to a report by the Joint Economic Committee of the United States Congress, the total projected requirements for highway and bridge needs through the year 2000 approach 720 billion dollars. Even though in recent years both the federal and state gas tax levies have been increased, there will still remain a shortfall of approximately 265 billion dollars for highway and bridge repair.

The deterioration of our nation's water supply and distribution systems, as well as wastewater treatment facilities are in desperate need of attention as well. The projected shortfall in these areas is approximately 90 billion dollars.

State and local governments have not been spared either. Burdened by very sharp cuts in federal grants, these localities have been unable to pursue any type of public investment programs. Additionally, the state and local governments will suffer because of the 4 billion dollar loss of the Revenue Sharing Program. Because of the problems with the federal budget deficits, the state and local governments have been put in the position of being responsible for more and more of the funding required for repair and modernization without the regular supplemental funding received from the federal government. Many states, counties, and cities have been working extremely hard on developing innovative ways of investing in infrastructure spending, but they just do not have the resources to go it alone. Therefore, any and all initiatives will require the cooperation of all levels of government, as well the private sector.

We must remember that public works investment will not materialize if left solely to the marketplace. Federal, state, and local governments provide public works financing primarily for achieving an efficient use of resources, and assuring an equitable distribution of services. If left up to the devices of the marketplace, these goals may never be realized. If one were to evaluate the economic consequences of planned road construction, a governmental agency would consider potential time savings, productivity improvements, industrial development, and safety. On the other hand, a private company that was contemplating this same road construction project would give the highest consideration to the potential revenues gained from the users of that system. Therefore, private companies would find fewer instances in which the benefits of such activity outweigh the costs, and as a result, fewer roads would be built than are needed.

State and local governments simply cannot provide the necessary funding on their own. The upgrading and rehabilitation of an eroding and deficient network is a massive undertaking. This is why there is a strong need for federal assistance. The only way the complete restoration of the United States infrastructure can be accomplished is in a cooperative atmosphere. One in which all levels of government, local, state and federal work together towards a common goal.

I would also like to point out some of the problems that we now face in terms of public works financing due to the 1986 Tax Reform Bill. That legislation made tax-exempt bond financing exceedingly more difficult and expensive. Restrictions that were placed on arbitrage will ultimately lead to higher costs for local borrowing, and tighter state volume caps have the potential for significantly reducing private activity bond issues. Correcting these problems would serve to assist many genuine public infrastructure projects.

Naturally, as president of the Building and Construction Trades Department I have an interest in the jobs potential resulting from an increase in this type of spending. The experience of the 1960's and 1970's demonstrates that public works investment programs can be highly effective in providing jobs and contributing to the overall growth of our nation's economy. An evaluation of the 1976 Public Works Act can be used as an illustration in how significant numbers of jobs can be created in the building and construction industry, as well as in other industries.

According to the AFL-CIO's Department of Economic Research, this program played a considerable role in the recovery from the 1974-75 recession. The 6 billion dollars that was spent as part of the Local Public Works Program generated approximately 110,000 direct onsite construction jobs, while also providing 66,000 jobs in the building material and supply industry. The additional income of these workers had a ripple effect on overall sales and production, and it is estimated that another 250,000 jobs were created throughout the economy. The total (426,000 job years) represents an average yearly cost of $14,000 for each job.

Based on this experience, and adjusting to today's prices, closing the current gap in federal infrastructure spending of $7.5 billion per year would create nearly 300,000 jobs throughout the economy.

The problem is not out of hand yet, but the longer we wait the harder it will be to catch up. The time for action is now.

I don't think anyone would argue against correcting this growing problem within our nation's system. As more and more people become aware of the magnitude of the situation, and the critical stage we presently find ourselves in, then I sincerely believe that the necessary funding for this undertaking will be made available. However, it is usually the case that action such as this does not occur until a major catastrophe takes place and public opinion has focused on it. Obviously, I hope that is not the case. Perhaps these hearings can become a catalyst that initiates the action that is needed to remedy this most serious of problems. We cannot lose sight of the fact that the long term economic growth of the United States is dependent upon the adequacy of its public works facilities.

Thank you.

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10/87

NATIONAL INFRASTRUCTURE ISSUES

WEDNESDAY, OCTOBER 21, 1987

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
SUBCOMMITTEE ON WATER RESOURCES, TRANSPORTATION,
AND INFRASTRUCTURE,
Washington, DC.

The subcommittee met at 10:08 a.m. in room SD-406, Dirksen Senate Office Building, Hon. Daniel Patrick Moynihan (chairman of the subcommittee) presiding.

Present: Senators Moynihan, Burdick, Reid, Graham, Symms, Stafford, Durenberger, and Pressler.

OPENING STATEMENT OF HON. DANIEL PATRICK MOYNIHAN, U.S. SENATOR FROM THE STATE OF NEW YORK

Senator MOYNIHAN. A pleasant good morning to our guests and our witnesses. I apologize for the late beginning but we are required to be in several places at one time.

We have a very important hearing in this series on infrastructure, and today, we are going to hear from scientists in the field and some practitioners who have been thinking of this as an item on the national agenda, something more than an abstraction, but something that needs to be and can be done.

In particular, we have Lawrence Dahms, who is Chairman of the Committee on Infrastructure Innovation of the National Research Council, which has issued its report. It is a very impressive document, indeed, the framework for a research agenda; and then from Jenifer Robison, who is Project Director of the Energy and Materials Program of the Office of Technology Assessment, that innovation of the 1970s which has yet to prove whether or not it is an equivalent of the President's Science Advisory Committee or not.

But there is a rule in social science that organizations can conflict and become like one another, and it is wonderful to watch the conflict techniques migrate from one branch of the government to the other. The President got a budget office in 1921; we got ours in 1974. The President got a President's Science Advisor 1946; we got ours in 1973. They haven't made their way over to the Supreme Court yet, but they will; the staff has not.

We are looking forward to these hearings, and it was very thoughtful of you, our Chairman Emeritus, to be here. I know you have to be at another committee most of the morning.

OPENING STATEMENT OF HON. ROBERT T. STAFFORD, U.S. SENATOR FROM THE STATE OF VERMONT

Senator **Stafford**. Thank you, Mr. Chairman. I am glad to be here, and I am gratified that you are holding these hearings, because questions about infrastructure are very important to the future of our Nation and its welfare. I am going to stay here as long as I can, but the Labor and Human Resources Committee is involved in a hearing this morning followed by a controversial markup with a number of amendments being offered. I will have to be present to vote so that when I do leave for the other committee it will be with reluctance. But being torn between two or three committees seems to be common to our lives anyway.

In any event, I am glad we are having these hearings, and I hope I can stay long enough to hear all the witnesses. I do have some questions which I ask to be submitted to the witnesses in writing at the conclusion of the hearing.

Senator **Moynihan**. Of course.

Mr. Chairman, it was very thoughtful of you to be able to find time to be here. It is hard to be a Senator, but you can be a stock broker.

OPENING STATEMENT OF HON. QUENTIN N. BURDICK, U.S. SENATOR FROM THE STATE OF NORTH DAKOTA

Senator **Burdick**. Thank you, Mr. Chairman. This series of hearings on infrastructure has been instructive and interesting. I sense that with the hearing today, we are beginning to focus on the causes of our infrastructure problem. We have always been a Nation with a "can do" mentality. When we came up against a problem, we cited it and finally found a way to solve it. Now we have formalized that kind of activity, and it is called research and development or innovation. Whatever name we choose, we always have been rather good at it.

As a result, we have produced a high standard of living, but we are beginning to see cracks in that high standard, and a less than adequate infrastructure has been identified as the cause.

Today, we are going to hear testimony which focuses on research, development and innovation. Hopefully, this testimony is going to help explain what role research and development can play in the success or failure of our infrastructure.

Also, our history of success in research, development and innovation does not seem to be applicable to the public and private infrastructure sector of our economy. I look forward to this testimony very much.

Thank you, Mr. Chairman.

Senator **Moynihan**. Thank you. I just will set a little specific for our witnesses. One of the things that we have been thinking about in this Committee and have, indeed, prepared and introduced legislation for, is to establish a new rail system on the eastern seaboard, perhaps, to begin with, and then elsewhere in the country, using superconductivity techniques—we use the term fast track as an acronym—trains that would run at speeds somewhere above 300 miles an hour. Our rail cars are shuttles now, and they have obviously reached their limits as to their transportation in crowded areas.

We know how to do this. We just had the most extraordinary set of Nobel Prizes granted to those two gentlemen in Zurich working in an IBM lab, and then there are people in Houston and elsewhere. The whole world of physics has changed with respect to conductivity, and it raises or casts questions on fundamental physical principles. People know they can do this; they don't know why, which is one of the fascinating things of science. We have some programs in which it was not uncommon to discover an effect which could not be explained but which could be replicated.

This commences to arise at a question which has, for a long time, been a standard observation about the English economy and the English continue to be very highly productive in science, but that their science gets translated to technology by other people. It is something to watch here. We continue to fuss around, trying to make the railroad train more effective, which is worth doing, but we are working on an 1840 machine and improving it marginally a century and a half later.

Fixing up the technology which first happened in the 19th century is interesting as a hobby, but there is not much of a use as an actual economic event. I mean, how do you produce transportation for the 21st century? We could easily have rail systems that would get you from New York to Chicago in an hour and a half.

It is obvious that the science has been done. We need the technology. That is what we are about, and that is what we look forward to hearing about. That is why we welcome especially, the Senator from Minnesota, because if we had such a device, we might get from here to——

Senator DURENBERGER. The "homer dome."

Senator MOYNIHAN [continuing]. To the homer dome, and we could watch the World Series and get home at night.

Senator Durenberger?

Senator DURENBERGER. Mr. Chairman, thank you. I don't have a statement. I look forward to the testimony of the witnesses.

Senator MOYNIHAN. Fine.

Mr. Dahms and Ms. Robison, would you come forward, please? Mr. Dahms, I believe you are first, and we welcome you most especially as it is not every day we see someone from the National Research Council here, and we look forward to your testimony.

STATEMENT OF LAWRENCE DAHMS, CHAIRMAN, COMMITTEE ON INFRASTRUCTURE INNOVATION, NATIONAL RESEARCH COUNCIL, WASHINGTON, DC

Mr. DAHMS. Thank you, Mr. Chairman. Mr. Chairman and members of the subcommittee, thank you for the opportunity to appear before you this morning. I am Larry Dahms, the Executive Director of the Metropolitan Transportation Commission for the San Francisco Bay area; however, I appear before you this morning in my capacity as the Chairman of the Committee on Infrastructure Innovation of the National Research Council.

The committee's full roster is attached to this testimony. As you will note, its composition includes people who have managed infrastructure systems such as transportation and water resources at various levels of government, who think about financing infrastructure systems and who run large research organizations focused on components of infrastructure.

I will be speaking directly from the prepared testimony. However, I intend to abbreviate it considerably.

The Committee on Infrastructure Innovation was created in response to a request by the National Council on Public Works Improvement that the National Research Council examine:

First, promising research areas for technological improvement of infrastructure;

Second, factors governing an adoption or reaction of technological innovations; and

Third, the means for developing and carrying out a national research agenda to foster innovative research for infrastructure systems.

Our report was released just yesterday, and it is submitted to you for the record.

Senator MOYNIHAN. That is this report we have here. Does everybody have a copy? No. Could we see that everybody gets a copy?

Mr. DAHMS. I am pleased to submit it to you for the record.[1] The subcommittee, I think, will recognize that the National Research Council faced a difficult charge. It was necessary, first, to consider whether a research program that would focus on infrastructure as a subject would actually have value.

After agreeing that it would have value, the committee had to define an ambitious research program in an area for which definitions differ and for which there is no natural constituency in government, in industry, or in academia.

These difficulties limited what the committee could do in its 5-month life. However, the committee did agree that a research effort that takes a synoptic view of infrastructure is needed; that the research must complement the research already under way in transportation, waste treatment and other modes subsumed under the phrase "infrastructure," and that a continuing institutional approach to invest this overall research effort with focus and coherence is needed.

The exact nature of this institutional focus is at this point indeterminant and warrants an intensive examination of financial support mechanisms, organizational structure and scope. That examination is the next step recommended by the Committee: A two-year implementation effort to create a comprehensive research agenda in concert with the relevant constituencies in government, industry and academia. The committee believes quite strongly that a continuing institutional focus cannot be created Athena-like but, rather, requires cultivation if it is to flourish.

What are the opportunities that transcend these modes? What are the barriers to their use? And what is the nature of the implementation program recommended by the committee?

The committee identified illustrative opportunities that flow across the various modes of infrastructure in materials sciences, information technology, urban and regional planning and non-destructive evaluation. For example, taking a close look at non-destructive evaluation, the committee found a rich lode of application of this research technique to problems afflicting virtually all of public infrastructure.

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[1] The report referred to has been retained in committee files.

While many opportunities exist, such a program is also faced with many barriers. It is arguable that the barriers identified by the committee provide an even stronger imperative for creating a national focus for infrastructure research. The barriers common to infrastructure modes are familiar and formidable. They include the large scale of public works projects in contrast to the limits of the ability of local communities to maintain and enhance their infrastructure systems, the chilling impact of wary buyers on the potential market for adopting innovations and the fragmented institutional structures within which infrastructure systems are developed and operated.

These and other barriers must be responded to in any attempt to stimulate innovation with regard to infrastructure systems.

To do so, first, a national effort to encourage more and better research is required.

Second, steps must be taken to ensure that the beneficial results of such research are transferred to and adopted by managers, suppliers and users of infrastructure systems.

And third, the barriers to and incentives for innovation should themselves be the subject of public policy research as part of a national infrastructure research agenda.

To bring this program into being, the committee recommends that a 2-year implementation program be initiated immediately, to explore with the many constituencies involved in the infrastructure system the prerequisites to create an organization that would provide the stimulus, focus and coherence for a sustained effort in infrastructure research. The committee believes that the tasks of this two-year implementation program should include:

Defining the managerial structure, financial mechanisms and limitations under which this organization should operate; developing a national agenda for research and development for infrastructure systems that identifies the current gaps in research and notes research opportunities for addressing problems common to several modes; bringing into the program the talent and expertise of the various existing research groups; establishing minimum goals and criteria for research and implementation; and informing Federal agencies, the user and professional communities and the public about the opportunities for research in building a more effective infrastructure system.

The committee has no illusion that the continuing effort to be shaped by the 2-year examination will, in itself, solve the difficulties of infrastructure innovation. The need, the opportunities, and the required resources are all too vast. However, it believes that this continuing effort, if well-founded, can become the nation's catalyst for:

Encouraging the development of necessary research programs where they are deficient;

Giving attention to promising, long-term research projects which do not now have readily apparent constituency;

And fostering research broadly applicable to all parts of our infrastructure.

Mr. Chairman and members of the committee, this completes my testimony. I will be delighted to respond to questions you may have. Thank you again for the opportunity to appear before you today.

Senator MOYNIHAN. Thank you, Mr. Dahms. Next we will turn to Ms. Robison?

STATEMENT OF JENIFER ROBISON, PROJECT DIRECTOR, ENERGY AND MATERIALS PROGRAM, OFFICE OF TECHNOLOGY ASSESSMENT, WASHINGTON, DC

Ms. ROBISON. Thank you very much, Mr. Chairman. Thank you for the opportunity to appear before the Committee this morning. I am Jenifer Robison, Project Director and Senior Analyst with the Congressional Office of Technology Assessment.

OTA completed a survey on research and development in construction technologies and materials for public works in June of 1987 at the request of the Senate Environment and Public Works Committee.

My written testimony, which was submitted for the record, was based on that study; I will provide a brief summary this morning.

In that study, OTA found that improved materials and construction methods could provide substantial cost savings in public works construction and maintenance. For example, we found $15 to $35 billion could be saved over the next 10 to 20 years from improved materials for highway repair and construction alone.

Despite this potential savings, however, R&D for public works receives very little funding by all levels of government and in the private sector. Federal funding for public works R&D is less than $100 million annually; non-Federal spending is even lower.

An obvious reason for the low level of government funding is budget priorities in the face of massive deficits. Low private sector R&D also can be attributed to general economic conditions to some extent. But it is also due to a number of disincentives to R&D. For example, while improved materials and construction methods can have a lower life-cycle cost, they also tend to have higher capital costs. When contracts are awarded on low bids, it is not to your advantage to propose innovative materials that may cost more.

Contracts may also specify the materials or methods to be used in construction, leaving no room for innovation. In addition, industry does not view investments in public works R&D as conferring any competitive advantage. Construction materials, for example, generate a low return and have a long pay-back period compared to other investments industry could make. As a result, industry tends to view these materials or technologies as commodities that may be adopted by all who work in public works.

Basic research, in particular, is underfunded. Rather, the industry tends to adapt other research results to public works, and most of the R&D money goes into such adaptations.

Even when innovative materials and methods are available, public works agencies may be unaware of them due to inadequate information exchange, or they will perceive a high level of risk in using innovative materials.

Public works agencies place a very high value on the reliability of their services. When you turn on your water faucet, you expect to receive water of a consistent pressure and quality. If innovative materials are used in that water system, and either the delivery itself or the quality of the water is, therefore, impaired, there is both a very high political and economic cost to repairing them. Although OTA was unable to quantify the exact amount of R&D that is needed to meet the current needs of roads and bridges, and water and wastewater systems, we do not believe that it would require a huge increase in R&D funding.

Particular areas, such as determining national needs based on local priorities, and identifying the extent to which procurement processes do pose a disincentive to R&D or the use of innovations could use attention. Information exchange also needs improvement. At the extreme, a National clearinghouse that would be a source of information for public works agencies or for R&D groups would be to major assistance.

None of these options requires massive spending. However, what we do need is for the R&D to be focused on particular areas, as the SHRP program is, and for the R&D to be combined with incentives for implementation of the research results.

There is a major contrast in the United States with countries in Europe and in Japan, where the governments provide both information on the innovations that are available and incentives to move those innovations into the marketplace. In particular, they have programs where there is government and industry co-funding.

In sum, the benefits from increased R&D on materials and construction for public works in the U.S. could be huge, and the costs could be relatively low if the R&D is focused properly.

Thank you.

Senator MOYNIHAN. We thank you. We have two Senators that have come since we began. Senator Pressler, would you like to make a statement?

Senator PRESSLER. Mr. Chairman, I don't have a formal statement, but I would just say that I think that this research and development and infrastructure hearing is very important, and I would reiterate the theme I have said before: Our smaller cities and towns are very much in need of this as much as our large cities, and some of their needs are different. The economy is different in the rural areas. The needs of smaller cities and towns regarding be it water systems or bridges or whatever else, and I shall be looking very closely at this report in terms of its dealing with rural areas and smaller cities and towns.

Thank you, Mr. Chairman.

Senator MOYNIHAN. Senator Graham?

Senator GRAHAM. Thank you, Mr. Chairman. I apologize for not hearing the full presentation of this panel. The question that I have been interested in is what is the Federal role in infrastructure development for America into the 21st century. One theme that has recurred in hearings that we have had to date is the research and development function which is, I think, very important and highly appropriate for Federal attention.

I appreciate Ms. Robison's remarks, which have helped focus the possible direction of that with greater clarity.

Senator MOYNIHAN. Senator Symms, if you would like to say something as we move to our next request?

Senator SYMMS. I have no statement this morning, Mr. Chairman. I am glad to see you moving forward with these hearings.

Senator MOYNIHAN. I would like to thank you for your statement, Mr. Dahms. I would like to ask what it is exactly you would like the committee do?

What do you mean by nondestructive evaluation? I think I know what you mean, but I am not sure.

Mr. DAHMS. Nondestructive evaluation is a concept that embodies a lot of different techniques for examining the state of infrastructure monitoring.

Senator MOYNIHAN. It comes under the heading "maintenance"?

Mr. DAHMS. Yes, its level of deterioration in a manner where you then don't have to destroy it in order to find out what the situation is, in effect. It is a whole series of techniques used to monitor the condition of the infrastructure.

Senator MOYNIHAN. An analogy in medicine would be a probascope?

Mr. DAHMS. Yes.

Senator MOYNIHAN. All right. You have a good bunch of people there. I see my own social friend Frank Raines and some very highly-skilled gentlemen. Did any of you come up with something that excited you that anybody said, "I have an idea; this would be fun to do"?

Mr. DAHMS. Ideas that would be fun to do?

Senator MOYNIHAN. Yes.

Mr. DAHMS. Well, in addition to the 11 people that were on the panel, there were some 25 or 30 who participated in a brainstorming conference of sorts last June. Let me say, there was no shortage of ideas.

Senator BURDICK. Name one.

Senator MOYNIHAN. That is what we are doing here, trying to see.

Mr. DAHMS. In the transportation business, for example, there is the notion that at some point, the vehicle could be under some kind of control so that you could get more capacity out of the roadway. That is an idea that has been examined off and on at some of the universities. It hasn't borne fruit yet, but in minor ways, it has worked, and the report refers to the, I think it is the Holland Tunnel of New York where the shock waves of traffic can be alleviated by metering the traffic into the tunnel.

The same thing works on the Bay Bridge in my area, where we meter the traffic across the bridge in order to get the optimum flow across the bridge.

The question is whether that kind of technique can be expanded to a whole system. At the moment, we don't have the capability of doing that, but that as an example that was discussed at Woods Hole.

I think that, again, I would say that amongst the people that were at Woods Hole——

Senator **Moynihan**. All you could think about was the arithmetic of putting a 19th century automobile into a 19th century tunnel and getting it from the New Jersey shore back?

Mr. **Dahms**. All we could think of?

Senator **Moynihan**. I mean, that is the sort of thing you can do on the back of an envelope.

Mr. **Dahms**. Today, the notion of metering a flow of traffic.

Senator **Moynihan**. By metering, do you mean that you allocate so many units in so much space in so many units of time?

Mr. **Dahms**. That is right.

Senator **Moynihan**. Surely that is not all.

Mr. **Dahms**. I would agree that today, the idea of metering a flow in a single lane or single section of a highway is seen as simple. The idea of expanding that to an entire system is not simple.

But again, I would suggest that there is no shortage of ideas. Every scientist that was involved in the session had several ideas. The question is: How to create an institutional framework so that those ideas can blossom?

I think that was, in the time that we had, the five months that we had, while there was no shortage of ideas, we didn't feel that we had the ability to give you a definitive research agenda.

Senator **Moynihan**. Could I give you a thought that if you want to go back to your people, we would appreciate it. We are good at institutional framework; we are not good at ideas. If we don't know what you are talking about, we are not likely to do anything about facilitating it.

Would you give us a list of 10 good ideas? You might be surprised what will happen. In a certain sense, we are just finishing the interstate highway system, which was the last idea we had in transportation, I suppose, and the idea of separated multilane transportation, of tolls, that begins in Germany, and I don't know exactly where you would say it happened, but it was an idea.

The next thing you know, you had the largest public works program in history, because General Motors jumped off in futurama in the 1939 World's Fair.

Do you think it is possible to build a rail system, of levitated cars that will move at 350 miles an hour? That would be interesting, wouldn't it? It is nice to get traffic through the Holland Tunnel, but we have been been doing that very well since 1922.

Could we build a 300 mile an hour rail system?

Mr. **Dahms**. I don't know whether we can build a 300 mile an hour rail system. We can build one that is a lot faster than anything we have in the United States today. The technology, I don't think, is as much a limiting factor as a number of others.

Senator **Moynihan**. What would be the technology?

Mr. **Dahms**. Well, I am not sure. The experimentation in France and/or the demonstration in France and in Japan illustrates that we can do a lot better than we are doing here.

Senator **Moynihan**. The Japanese have demonstrated speeds up to about 270 miles an hour or above that.

Mr. **Dahms**. I am not aware of exactly how fast they are.

Senator **Moynihan**. Who knows what the Japanese have done here?

Senator **Graham**. I do.

Senator MOYNIHAN. Senator Graham, tell us.

Senator GRAHAM. Well, this is not new technology. This has been around for over 20 years. The Japanese have had the the bullet train, which travels at speeds of 160 miles an hour, started between Tokyo and Osaka, and now runs north and south of there, almost the full length of the main island.

It moves tens of thousands of people every day and according to the Japanese Minister of Transportation, that section of the Japanese national railway, if it were free-standing, would be profitable. It is merged into a larger system which is government subsidized.

But this is certainly not ground-breaking technology. This is technology which is one-quarter of a century old and highway-tested.

Senator MOYNIHAN. But I do believe that they have it in the field.

Senator GRAHAM. They have the two experiments with magnetic levitation. One is being done by the Japanese national railroad, and the other one by Japan airlines. I rode on the magnetic levitation.

Senator MOYNIHAN. Where?

Senator GRAHAM. It is on the southernmost island in Japan. That is the island where the experimental track is located, and the Japanese national railway is doing its track of approximately 5 miles, more or less, in length, which constricts its full speed, but even at that short length, it will get up to a speed of close to 200 miles an hour.

Senator MOYNIHAN. So they have got a field experimental levitation system now?

Senator GRAHAM. Correct.

Senator MOYNIHAN. That is what we understand, and the French have something of the same? Does OTA know anything about this?

Ms. ROBISON. We pointed out in our report that one of the areas in which R&D is lacking is totally new ways of doing things. Nobody is looking at how to deliver people or how to deliver water in a completely new way, and the one exception that we cited was the application of superconductivity for magler transportation.

Senator MOYNIHAN. Why don't you do us a favor? That is, go back and call up Tokyo and call up Paris to find out what they are doing, and tell us, okay?

Ms. ROBISON. We are starting a study on superconducting materials.

Senator MOYNIHAN. Don't start a study; just go back and call up Tokyo and Paris. Let's get specific about this. We have a chance to do something quite exceptional.

Senator GRAHAM. If I could say, several years ago our State set up a commission to initiate a high-speed rail system. We have a goal of having it in operation by 1995, and we have good prospects of meeting that goal. The real problems are not the technological problems, if your commitment is to essentially replicate a known technology.

They are more administrative and legalistic. As an example, and this may be something, Mr. Chairman, that our Committee could deal with directly, the question of corridor locations for these facilities is what essentially undermined the effort to do a high-speed rail system between San Diego and Los Angeles. There is a corridor that is available in most places in the United States, and that is, the interstate corridor.

Senator MOYNIHAN. Yes.

Senator GRAHAM. Traditionally, the interstate corridor has been thought of as a uni-purpose corridor, and I think that that is a very restrictive definition of a very valuable national asset. If we could begin to rethink that as being a transportation and even now, a multipurpose corridor which could accommodate, for instance, a high-speed rail facility, that would be a tremendous contribution to shortening the time when some of these new technologies would actually be available.

Senator MOYNIHAN. All right. Now we begin to have an agenda. How much of the new superconductivity science, can we produce beyond what the French and the Japanese are doing?

We might end up doing with the Japanese making the machines. That is getting to be a pattern; the British have that system, and the next thing you know, we will take up the English disease.

We thank you very much. OTA, we will write you a specific note on that, but make that phone call when you get back. I have to make a quorum down the hall in Foreign Relations.

Mr. Chairman, would you take over while the next panel comes? I will be back instantly.

Chairman BURDICK. Yes. I have a question for this panel.

Senator STAFFORD. I have a question, too.

Chairman BURDICK. You ask yours now, Senator.

Senator STAFFORD. All right, thank you. Since the discussion just now got on railways, I think it is important to note that probably the word infrastructure means different things to different people, and it is, in my experience with this Committee, it is something we have talked about for a number of years.

It appears to me that during the years I was Chairman, that enthusiasm for doing something about infrastructure sort of went up and down with the state of the national economy. When the economy was down, people from around the country, principally mayors and some Governors, were very enthusiastic about the Federal participation and doing something to help the infrastructure.

When economic conditions were improved, there was less push to do something about it. So it seems to me the state of the economy has something to do with how much effort we might want to try to put into infrastructure, rebuilding, reestablishment and renovation.

It is interesting, therefore, that in your report, your first footnote more or less defines public works infrastructure, and it covers a very broad range of items. I think that ought to be noted for the record. I would, at this point, Mr. Chairman, propose that in our hearing record we include the definition of—I am going to call it definition—public works infrastructure as it appears on page 4 as a footnote of the "Infrastructure for the 21st Century" report that is in front of us this morning.

Senator BURDICK. Do you want that for the record?

Senator STAFFORD. It is a definition of only one paragraph.

Senator BURDICK. Without objection.

[The definition referred to follows:]

In this report, the term "public works infrastructure" includes both specific functional modes—highways, streets, roads, and bridges; mass transit; airports and airways; water supply and water resources; wastewater management; solid-waste treatment and disposal; electric power generation and transmission; telecommunications; and hazardous waste management—and the combined system these modal elements comprise. A comprehension of infrastructure spans not only these public works facilities, but also the operating procedures, management practices, and development policies that interact together with societal demand and the physical world to facilitate the transport of people and goods, provision of water for drinking and a variety of other uses, safe disposal of society's waste products, provision of energy where it is needed, and transmission of information within and between communities.

Senator STAFFORD. All right. But I do have a few questions, but before I get directly to them, Ms. Robison, one of my friends in the House of Representatives for number of years, Howard Robison, I presume it is not a coincidence, but was he any relation to you?

Ms. ROBISON. Not that I know of.

Senator STAFFORD. He was a good man. You could claim him with pride. I am sure if he were still alive, he would be pleased to claim you.

Mr. Dahms, are there any incentives the Federal Government ought to undertake to encourage the private sector to undertake and develop infrastructure?

Mr. DAHMS. Yes, there should be a number of incentives. Ms. Robison actually mentioned one of them in her testimony, and that is the question of procurement practices themselves. We were asked by the Council on Public Works Improvement to determine whether there are barriers to innovation, and we identified a number of them. Procurement practices constitute one. The whole question of how you deal with low bidding was another point made by Ms. Robison, and also examined by our committee.

So dealing with procurement providing incentives of some sort, there is not much incentive for doing any research at all by the private side in the area of infrastructure. Some kind of funding program should eventually be made available so that private groups could join.

Senator STAFFORD. All right, sir. Would you have any different response than that, Ms. Robison?

Ms. ROBISON. I would add one that I mentioned before, information exchange—perhaps a clearinghouse, plus government-industry co-funding of projects. There are also possibilities such as government insurance for the use of innovative materials for construction technology to alleviate the risks.

Senator STAFFORD. Do either of you believe that current design standards and environmental requirements should apply to infrastructure research projects?

Mr. DAHMS. That they do what?

Senator STAFFORD. I will repeat that. Do you believe that current design standards and environmental. requirements should apply to infrastructure research projects?

Mr. DAHMS. Well, I doubt if there is—there is probably almost nothing you could do that doesn't somehow or another get impacted by standards, existing standards.

Standards certainly serve useful purposes. But also, they get in the way of innovation, and you can't, with a broad stroke, say that you are going to suspend all standards. But on the other hand, you can intensively examine those that seem suspect, attempt to identify those that are suspect in certain circumstances and then see if there is a way to resolve the problem.

Senator STAFFORD. The second part of my question is: Should environmental requirements be considered in designing to improve or refurbish infrastructure?

Mr. DAHMS. The environmental requirements also serve a purpose, and therefore, in a sense, instead of being seen as a problem, needs to be seen as a challenge to be resolved as you attempt to build whatever has to be built or maintain whatever has to be maintained.

Again, while they serve a purpose, I am sure that there are certain environmental requirements that are suspect as well and careful review needs to identify those that are not serving their own basic purpose and are getting in the way of other things that need to be done.

Senator STAFFORD. All right. Miss Robison, would you differ with either answer?

Ms. ROBISON. Not really. Design standards in themselves can act as a disincentive to doing the R&D to begin with. If specifications say "asphalt," why bother to develop a new paving material? But there has been insufficient research on whether or not performance standards could be substituted effectively.

Senator STAFFORD. All right. I thank you both. Getting back to the railroad situation, if some form of levitation could get us a restored railway from here to Montreal, which happened to go through Vermont and has been discontinued from Springfield, Massachusetts north because the railroad trackage was so bad they had to slow down to something like twelve miles an hour. We, in Vermont, would be delighted to find that levitation working.

Senator BURDICK. I would like to put this question to both of you. Miss Robison's testimony states that infrastructure includes all types of public facilities such as highways, roads and bridges, water resource projects, water supply and treatment systems, sewer systems, wastewater treatment plants, locks, dams, waterways, ports, airports, railroads, mass transit facilities, public buildings and resource recovery facilities.

Now, that covers the waterfront. We have been accustomed, in this committee, to dealing with these subjects one at a time in more or less the specific. So my question is, to both of you, what do you think is the single-most effective and feasible action Congress can take to strengthen the infrastructure of our Nation? Any specifics?

Mr. DAHMS. This goes beyond the question of research and innovation.

Senator BURDICK. I am asking you: What is the most single effective thing we can do?

Senator STAFFORD. Right now, we could save the stock market.

Ms. ROBISON. As a preliminary step, sir, I would say that the first thing we should do is determine what the national needs are compared to the local priorities.

Senator BURDICK. In other words, we are going to be investigatory and find out what we need.

Ms. **Robison**. If we don't know what we need, how can we address fixing it?

Mr. **Dahms**. I think it goes a slightly different way, and I think that is, the most important thing Congress can do would be to recognize that the size, scope and diversity of infrastructure is such that there is not any single strategy, any single action that will really adequately address the problem.

What needs to be recognized is that a multiple strategy is required. Our recommendation to move into an implementation program attempts to target what would be done best where. We need to build on existing programs; we need to identify gaps; we need to determine what specific strategies are best to hit those gaps.

It is not just a Federal problem. It is very much a local problem in many ways, and a lot of the agencies you are dealing with, like little water agencies and what-have-you, would ~~be~~ overwhelmed, in a sense, by a large Federal program, but, instead would probably be better served by a more targeted type of operation.

So to repeat my basic premise, it is that the best thing the Congress could do would be to recognize the diversity of the nature of the problem, because it takes a diverse strategy to supply, to serve this diverse demand.

Senator **Burdick**. You will have to pardon my expression, but it isn't very definite what you have suggested, is it?

Mr. **Dahms**. Excuse me?

Senator **Burdick**. It is not very definite.

Mr. **Dahms**. I think it is definite in the sense that it is going to take a careful development of the response. There ultimately needs to be an institutional response. I can't give you an answer today. In our report we don't give you an answer as to precisely what that institutional response needs to be.

But it needs to be an institutional response that does respond to the diversity of the problem.

Senator **Burdick**. Thank you.

The Senator from Florida?

Senator **Graham**. Thank you, Mr. Chairman. We are dealing with an issue here that involves public administration, finance, institutional building, basic technological ideas. Each one of those subjects has many intriguing subsets.

I would like to focus on what is the title of the book "Infrastructure for the 21st Century, Framework for Research Agenda," which leads me to focus on: How do we stimulate ideas? In my experience, the most successful institutionalization of the process to stimulate ideas and impact on change was the land grant college system of the late 19th century, which put together pure research, demonstration, extension, and application in the farms of America and fundamentally revolutionized our agriculture and, in more recent years, world agriculture.

Is there an institutional structure to stimulate a similar rapidity of change in the areas of infrastructure that you might recommend? What is the 22d century looking to, the equivalent of the 19th century land grant colleges?

Mr. **Dahms**. Neither one of us is going to volunteer.

Ms. **Robison**. The extension agent, was a wonderful idea, which has, unfortunately, been cut back significantly. One option that I see would be using local governments. These are ultimately the users of the materials—the results of the research. An extension service could be started in local governments, or in other agencies coordinating with local governments.

The one place where this kind of thing is occurring right now is with the Army Corps of Engineers, which does the most significant chunk of Federal research on public works, including materials technologies, and then actually uses their own research results in Army bases and other projects for civilian applications.

That is where much of the information about innovation comes from.

Senator **Graham**. Could you suggest how that might be institutionalized, or what should the Federal Government do that it is not currently doing in order to accelerate the pace of change in the technology of infrastructure?

Ms. **Robison**. What usually does not occur is the interaction between the local government users, especially smaller towns and rural areas, and the large university research groups. Some way is needed to get those people together, even making local governments aware that this research is going on, and might be applicable to their particular needs.

Many local governments don't even have the funds to send their engineers to conferences, so they don't even get to hear papers presented; or they might subscribe to a journal or two, and they just do not hear that research is going on at all, let alone that it might be applicable to their particular problems. Some way of getting the research and user groups together, whether it is simply through an information clearinghouse to which they subscribe, or through cooperative workshops sponsored by the government, or even sponsoring local government groups to visit research centers, would be beneficial.

Mr. **Dahms**. I would, again, suggest that a multiple strategy is going to be required. A couple of examples of things that were considered by the committee in its deliberation, one is that within the universities and within the schools of engineering, little attention is even given to the question of maintenance of many parts of our infrastructure, design and construction has a much higher priority on the peer structure scale.

And so part of the multiple strategy would be to provide incentives by way of research grants and other such incentives, for this subject that is now being neglected to be raised a notch within the academic community.

A second example that was referred to, again, in these deliberations, was that a lot of Federal grant funds have been spent creating better and better sewage systems; we now have plants that are quite sophisticated, and yet don't have operators who understand the plants that they are operating and maintaining.

Here some kind of an extension service or whatever it might be in terms of training would be part of a multiple strategy that would be helpful.

Senator **Burdick**. Senator Reid?

Senator **Reid**. I have no questions, Mr. Chairman.

Senator **Burdick**. Thank you very much. Our next panel will consist of the following individuals: Dr. Richard Tucker, Director of the Construction Industry Institute; Mr. Albert Grant, President-Elect of the American Society of Civil Engineers; Dr. John A. Epps, Dean of Engineering from the University of Nevada and Dr. Damian Kulash, Director of Strategic Highway Research Program, Washington, D.C.

Welcome to the committee, gentlemen. You may proceed as you wish.

STATEMENT OF DR. RICHARD TUCKER, DIRECTOR, CONSTRUCTION INDUSTRY INSTITUTE, AUSTIN, TX

Dr. TUCKER. Mr. Chairman, my name is Richard Tucker. I am the Director of the Construction Industry Institute, an organization that is somewhat unique in the world, the only organization we know of that owners, contractors and academia have joined together to address the critical problems in the nation's largest industry, an organization dedicated not only to research, but to implementation of those results on the projects.

I am here to reflect CII's views regarding some of those problems and the urgency of addressing some of them. You might look first at the importance of construction in our society in our civilization. History shows that construction activities themselves have been responsible for much of civilization's improvements, all the way from the Egyptian pyramids through the Roman Empire's expansion to our own country. I might claim that there is more impact upon our individual lives from the interstate highway system, water and sewer system, infrastructure-related things, than there is from our space program, computers, electronics, or the so-called high-tech and glamour industries.

The construction industry is the Nation's largest industry, representing about 10 percent of our Gross National Product act a $400 billion per year volume. Incidentally, that represents about one-third of the world's total construction volume here in the United States.

It comprises about one-sixth of the Nation's work force. It is an industry that tends to be taken for granted until things fail to function or they wear out. I would submit that the success of any infrastructure improvement program will depend heavily upon the construction industry.

This is the same industry for both public and private work. Thus, the fallout of any improvements are significant in our society.

The construction industry is an industry in trouble. We are seeing increased international competition and a decrease in market share internationally of the U.S. companies. We are seeing significant penetration of foreign firms into the U.S. market. We are seeing a downsizing of U.S. companies and takeover of some of those companies by foreign firms.

It is an industry that is fragmented, characterized by a lack of progress and a lack of research and development. We have seen a significant productivity decline in the industry over the past 20 years. It has a poor safety record. All of the demographic projections show a decline in skilled workers over the next 20 or 30 years. It is an industry characterized by increasing costs.

We might look at the Japanese in contrast. The Japanese companies, invest 1 percent of their gross sales into R&D. For the big companies, this amounts to about $60 million per year. The largest Japanese companies, comparable in size to our largest U.S. companies, all have work forces of approximately 300 or more professionals engaged in R&D at campus-like research settings.

The $60 million annual budget for a typical large Japanese company is about ten times the size of the entire budget of the organization I represent, which is composed not only of large U.S. contractors, but also large U.S. owners.

The Japanese R&D firms involve a wide range of research activities, but there is a large focus on field activities, actually, developing methods for physically putting construction in place. I might mention some of these. These are all related to what they call robotics. I might tend to call them automation or combinations of automation and robotics.

We have almost no U.S. counterparts to those in our development and research studies. They have robots that will move materials, concrete, steel, and other things. They have robots that will do formwork, will actually place reinforcing steel into locations; robots that will place concrete, will finish concrete; that will do painting, insulation spraying; robots that will actually do inspection.

The characteristic feature of all these robots is that they take about one-half of the normal work force. They do not require overtime. They can work in poor lighting. They can work in poor weather conditions. We think that their development will be very significant. Many of these robots are in advanced stages of prototype development. Many of them are actually used in projects in the field in Japan.

I would submit to you that an assessment is that if we do nothing, there are certain things that are likely to happen. One is that we will see an increased erosion of the U.S. share of the international market; we will see an increased penetration of foreign firms into the U.S. market; we will find that owners, including our Federal government, will eventually pay all the costs of doing nothing. These costs will be much larger than the cost of increasing investment in R&D.

There certainly is a need for Federal leadership in this. Not only should the Federal Government show leadership as it has in other fragmented industries, such as agriculture and medicine, into R&D which would benefit everybody, but I would submit to you also that our Nation is the largest owner of constructed facilities, and the largest owner of facilities has the most to gain by increased improvements in constructive facilities.

This completes my testimony. I will be happy to answer questions after the panel completes. Thank you.

Senator BURDICK. I think we should hear from the entire panel before we go to questions.

Mr. Grant.

STATEMENT OF ALBERT A. GRANT, PRESIDENT-ELECT, AMERICAN SOCIETY OF CIVIL ENGINEERS, WASHINGTON, DC

Mr. **GRANT**. Good morning, Mr. Chairman and members of the committee. My name is Albert A. Grant, and I am the President-Elect of the American Society of Civil Engineers, ASCE, the oldest national engineering society in the United States. In fact, in five days and six hours, I will become President, if I behave myself.

Senator **MOYNIHAN**. Careful, now.

Mr. **GRANT**. I am delighted to be with you today, and I thank you for this opportunity to testify on the important subject of the Nation's infrastructure research, development and innovation. ASCE has over 100,000 members with broad experience from engineers in private practice, engineers working for Federal, State and local governments and those employed in engineering research and engineering education.

Our society's major goals are to advance professional knowledge and improve the practice of civil engineering in service to the public by developing and promoting standards of excellence and by assisting our members to meet the challenge at the frontiers of developing technology and societal change.

Mr. Chairman, you have received my full statement, and I would like to take just a few minutes to highlight several key points. First, I come before you today to urge the Congress to develop and pass legislation that will promote research, development and innovation in the field of public works and infrastructure technology. In this era of fiscal constraint, when infrastructure investment as a percent of Gross National Product has declined significantly and visible signs of infrastructure deterioration are everywhere, it is incumbent upon us to explore new ways of deriving more quality and value from every infrastructure dollar invested.

Given current and near-term Federal budget realities and the vital linkage between a sound infrastructure and U.S. economic health and competitiveness, it is imperative that our country undertakes a concerted and systematic infrastructure research and development program.

Secondly, given the likelihood of a continuing significant shortfall in funding to meet our national infrastructure needs, we believe that the primary answer to this funding challenge is to work smarter. This means not only to develop new funding methods, but to develop new concepts in design, construction, rehabilitation and maintenance that will deliver greater cost effectiveness and performance for every dollar spent.

To achieve these goals, we need to promote innovation and to remove those obstacles which discourage innovation.

Civil engineers, for example, are under increasing pressure not to innovate because of outmoded standards and increasing liability risks. To promote creative and innovative technology, the nation's political institutions must recognize that additional risk is involved and be willing to adopt new standards of design and construction consistent, of course, with public safety and welfare, and to provide a reasonable level of risk protection.

Third, ASCE is presently involved in a number of activities related to infrastructure quality and innovation. As findings and recommendations on these various activities become available, I plan to share them with the Committee. To illustrate, ASCE has initiated a new program of peer review for government agencies. Modeled after the peer review programs for the private sector, ASCE offers peer review of design, construction and management programs.

Three pilot reviews have been completed and widely accepted, and we anticipate strong and growing interest in this program from public sector agencies.

Peer review strengthens the design and management capabilities and practices of organizations and increases the quality of their engineering products. Another major undertaking of ASCE is the development of a manual of professional practice for the quality in a constructed project. This manual is intended to improve quality by better defining the roles and responsibilities of each member of the construction project team.

The manual, which is expected to be released in January, will stress the importance of quality design, construction, and management concepts and practices, such as peer review, proper contract procedures, communication and coordination among the team members, alternative procedures, liability issues and other considerations.

Finally, I have asked ASCE's Technical Activities Committee which includes almost 5,000 civil engineering professionals working on almost every dimension of improved infrastructure research and technology, to provide me with a comprehensive report on how civil engineering research and innovation can save infrastructure investment dollars and serve the public. This report is scheduled for completion in early spring, and I believe that the Committee will find it of great interest and value.

Let me assure the Committee that infrastructure-related innovation can pay off for America through dollars saved and improved quality, public safety, and convenience.

My full statement contains a number of such examples, and there are many more in all components of our national infrastructure system.

In summary, Mr. Chairman, we would make the following recommendations:

First, a national program to provide leadership and commitment to innovative infrastructure research and development should be undertaken.

Second, the program should be supported by adequate funding to ensure meaningful and applicable research results.

Third, Federal funds should be made available on a partnership matching basis to stimulate States, cities and other governmental units and private industry to participate.

Fourth, new policies should be promulgated to encourage creative use of new materials and construction techniques and to provide a reasonable degree of risk protection.

Finally, to ensure program stability and continuity, Congress should employ a stable funding mechanism such as a multiyear authorization and appropriation, or a fractional set-aside from Federal construction programs.

Mr. Chairman, the American Society of Civil Engineers is committed to taking a leadership role in ensuring the quality and value of current and future infrastructure investments through increased innovation, research, and productivity in the design, construction and management of major public works projects.

We stand ready to assist the Committee in achieving this goal.

Senator MOYNIHAN. Mr. Grant, we thank you very much. We will get back to you, of course, but for the moment, I wish you good health and happiness. You should can watch yourself crossing the street for the next five days so you can be President of such a distinguished organization.

I believe our distinguished colleague, Senator Reid, would like introduce our next witness.

Senator REID. Thank you very much, Mr. Chairman. I am happy and proud to be able to introduce Dean Jon Epps from the College of Engineering from the University of Nevada, Reno. His testimony will indicate only a part of his involvement with trying to do something to improve the ability of this country to respond to the problems we have with rebuilding our infrastructure.

I am glad that Dean Epps is here. He and I have spent many hours together talking about the problems that face this Nation, and I also congratulate you for allowing Dean Epps to appear before this Committee.

STATEMENT OF DR. JON A. EPPS, DEAN OF ENGINEERING, COLLEGE OF ENGINEERING, UNIVERSITY OF NEVADA, RENO, NV

Senator MOYNIHAN. We are honored to have you, Dr. Epps.

Dr. EPPS. Thank you, Mr. Chairman. The infrastructure problem has been described most often in terms of catastrophic failures, such as bridges and water systems that have failed and have highlighted the enormous public investment required to solve the problem. I think most of the members of this subcommittee agree that we need a renewed national interest and commitment to public works in solving the infrastructure problem.

This will require continuous and substantial funding. We also need solutions that are cost-effective, that is, are cost effective in their use of available funds. This requires management of people, equipment, and materials.

I believe higher education, in particular, colleges of engineering, play a dynamic and important role in this whole effort. Just as the design and the construction of the infrastructure has required skills and expertise that originated within the university, it should be no surprise to us that expertise to address rehabilitation and maintenance of our infrastructure resides in the same location, that is, in higher education.

Support for education has been lacking in most of history. Many of the buildings for colleges of engineering in this country were developed and built in the 1940s. Equipment in some aspects is more than 20 years behind industry.

We have a 20 percent shortage of professors in certain key areas of engineering, and research budgets are seriously lacking countrywide. For example, research budgets are less than one-half of 1 percent of the expenditures for certain industries in this country.

If we look at middle technology industry such as the chemical industry and the auto industry, about 3 percent of their total expenditures are for research. High-tech industries are probably investing about 6 percent of their total budgets research.

The Morrill Act of 1862, established the mission of land grant institutions. That mission is teaching; it is research; and it is public service. These three distinct missions overlap and are necessary to get this country where it should be.

For example, in teaching, we need to have renewed emphasis in our undergraduate and graduate programs to solve problems and we need to emphasize the rehabilitation and maintenance of our infrastructure system and our other engineering structures, not just the design of new facilities and the construction of new facilities.

This continuous emphasis is only important if we take this to our students who will be leading the effort in the future. In our graduate courses, we need also to have more emphasis on rehabilitation and maintenance of our infrastructure.

We should consider to a wider degree non-traditional degree programs for mid-career people. These people would be coming back to the university from the public works groups throughout this country. They will take concentrated courses of one week or one and a half week in duration, receive credit towards Masters or perhaps even Ph.D.s.

We should also reemphasize that additional engineering courses should be offered in the evening hours to suit the needs of the public. We should also reconsider the concepts of extension courses, where people can take courses at home in their living rooms and at their own leisure in a programmed way.

Research. We need to conduct both basic and applied research. We need to more firmly establish cooperative research programs. One of the outstanding cooperative research programs in this country is the Highway Planning and Research program which is administered by the Federal Highway Administration. If you look at cooperative research between universities and local governments, it is poorly structured, and at present, at least according to my information, almost nonexistent.

The National Asphalt Pavement Association, has recently established a cooperative research program with Auburn University that I think will have significant impacts on solving the infrastructure problem.

The Federal Government certainly sponsors research in a variety of modes. Most of this research goes to the low-bid purposal that is technically qualified. This often results in not having the best agency perform the research. Furthermore it does not promote continuous programs of research at certain levels.

Public service is the third mission and probably one of the more important missions of universities throughout this country.

Continuing education is largely non-degree-oriented, which is certainly acceptable. It should be perhaps considered a requirement for reregistration of professional engineers. Consulting by professors and extension courses put on by professors brings the existing state of knowledge from the infrastructure-solving people in this country to the University. This program, I think, needs to be more fully established and developed.

Let's take a look at a particular case history. This involves the recycling of pavements. The stimulus for the recycling of pavements was brought before us by the oil embargo that started in late 1973.

We had really relatively few dollars available to spend on public works during the seventies. We had tremendous needs that we all recognized, and we had very high energy costs. Bob Mendenhall, a contractor and owner of Las Vegas Paving, developed equipment that can take old paving materials and recycle them back into new paving materials. Equipment manufacturers developed new equipment from his ideas and concepts and further developed the processes that allowed us to do it economically.

The Federal Highway Administration and State Departments of Transportation provided research funding and field laboratories for the university to perform research in mix design, structural design and synthesis of information to be brought before the Federal Highway Administration, State Department's of Transportation and local government agencies.

The Transportation Research Board provided the organization and implementation vehicles to assure that this took place in an orderly fashion. Today, we have a tremendous amount of recycling going on in this country.

Incentives have been addressed by other people speakers, and I would like to mention this again. We need to have incentives for universities, for public agencies, the contractors and other private sector groups. In the universities, very often, we will not be recognized, at least appropriately, for applied research, continuing education and training programs; basic research has, in a very important level of recognition in many, many universities.

The public agencies should consider funding for training, promotion for obtaining training, and higher salaries for those people that have an expertise with advanced degrees and advanced training. We need to reward these people that create new ideas and implement them to reduce life cycle costs.

The reward system for contractors is very difficult to grasp. We have a low first-cost bid arrangement in this country. Perhaps we should consider low life-cycle cost. Perhaps we should consider awarding contracts to those contractors who will guarantee, payements for five- or ten-year lifes.

I have worked with several large corporations in this country on research and consulting activities, and almost without exception, the time necessary to have a return on their investment is not met in the infrastructure problem-solving arena. Corporation would probably like to see two- or three-year returns to implement new areas of research. Today, it takes very often seven to ten years in order to introduce new products in the infrastructure area.

In conclusion, our Nation's universities have played a vital role in developing the infrastructure. Again, it should be no surprise to us that universities will play a vital role in solving the infrastructure problems of rehabilitation and maintenance.

Again, the mission of the land grant university is compatible with the infrastructure problem. That is teaching, research and public service. We need to expand and change some of our programs. We are capable of doing this, and the universities, I think, are the existing institution which is in the best position to have a significant impact on the infrastructure problem in this country.

This completes my testimony.

Senator MOYNIHAN. We thank you, Mr. Epps. I, for one, would like to get back to that vending technique you were talking about, but we will follow our pattern and now move to Dr. Kulash, who is Director of the Strategic Highway Research Program here in Washington.

STATEMENT OF DR. DAMIAN KULASH, DIRECTOR, STRATEGIC HIGHWAY RESEARCH PROGRAM, WASHINGTON, DC

Senator MOYNIHAN. Good morning, Doctor.

Dr. KULASH. Thank you, Mr. Chairman, members of the Committee. I am very happy to be with you today to talk about this very important subject. I commend you for getting into this issue with a long-run perspective as you have. All too often, when we talk about our infrastructure problems, it is in the context of some controversial environmental aspect or some crisis that has just occurred. It is very difficult in that kind of environment to chart a sensible, long-term course.

I commend you for taking the initiative and thinking through this area.

I am pleased to be a part of your discussion. My own vantage point, as my title suggests, is as a director of a research program dealing with one very specific part of the mission you are charged with. namely, highway research, and in particular, highway materials.

As I have listened to some of your conversations earlier and heard about visionary high-speed trains and the prospect of computer-controlled highway networks that channel traffic most efficiently, my imagination is certainly captured by these thoughts of exciting and glamorous possibilities. But at the same time, we do now have and will continue to have a highway system and an infrastructure that will continue to function well into the next century, even if we do—and I hope we do—have dramatic changes in all these other areas.

This existing physical plant is itself a target for major innovation and creativity, and we certainly don't want to overlook this as we look to other, more visible and tangible projects as well.

The interstate system that was mentioned earlier as being one of the great innovations certainly deserves that distruction, in terms of the functions that this road system provides and the level of convenience that it offers. It also introduced a great innovation or great number of innovations in the materials that we have used and improvements in the strength and durability we have been able to get out of those materials. This sort of innovation is less obvious to the eye, but it certainly makes a signification contribution to the efficient functioning of this sector of the economy.

With your permission, Mr. Chairman, I would like to submit my statement for the record, and simply talk about a few aspects I think would be relevant to your discussion.

Senator MOYNIHAN. Sure, please.

Dr. KULASH. One is concerning the Federal role in infrastructure. I believe that the conditions that typify the highway industry are probably typical of many other aspects of infrastructure, also. There are three things about this that make innovation something that is not going to happen very aggressively in the private sector here.

One of these, and it has been mentioned by my colleagues this morning, is the extreme decentralization of this industry. Most of the professionals and agencies that operate are spread, just as our roads are, throughout the country. Many of these people operate almost completely independently; they see their professional colleagues a few times a year; and that is about the extent of their professional and supervisory interaction.

They are scattered through numerous agencies. We have several Federal agencies that build roads in 50 states, thousands of county and tens of thousands of local and other government units.

Not only are they decentralized, but they use a great number of indigenous materials. This is important, because the basic volume of materials that goes into the construction of facilities is massive, and the economic use of these materials means that we have to take them from sources that are nearby to avoid the high cost of transportation.

But the other side of this coin is that we are always trying to build things out of combinations of materials that are somewhat different from one place to another. This poses a number of technical challenges, in using these materials efficiently and economically. Not only that, but the different conditions under which we try to build things with them also vary from one part of the country to the other, and this affects the suitability of these materials in one part of the country, where it is cold or wet, versus another part of the country.

The third aspect of construction in infrastructure is that it is done according to a set of fairly rigid standards and procurement processes. This has been mentioned, I think, by all of the witnesses.

Senator MOYNIHAN. It is interesting, if I could just interrupt, to say that each of you, in turn, have spoken of the problems of the standards which the public establishes for procurement, which is least cost, for first initial investment, something like that, as against long-term, how long will it last.

I am sorry.

Dr. KULASH. I think these standards have evolved for a very good reason. In this very decentralized industry, where there are numerous individuals scattered about making purchasing decisions, it is obviously a key component in good public management to have some fairly clear expectations of accountability that we achieve through standards.

At the same time, it makes it very difficult to introduce a new product that may have superior performance in the long haul but which may cost somewhat more at first. Most of our standards are geared toward a low initial cost. Demonstrating that a product will save you money in the long run is a costly, time-consuming thing to do.

Currently, most of our agencies that purchase these products have their own testing procedures and demonstration procedures, and a producer of a new product is understandably turned off when he has to try to demonstrate and prove this product repeatedly under different testing procedures. It does tend to impede the extent to which new products can be introduced.

For all three of these reasons—the decentralization, the use of indigenous materials, and the use of standards, and procurement processes—it is very difficult for the private sector, indeed, even for small public agencies, to undertake research, development and innovation entirely on their own.

This has been recognized, of course, in Federal policy, now, over the space of more than 50 years. We mentioned earlier the land grant college system, and something somewhat similar did evolve in the highway area back in 1934 as part of the Haydan-Cartwright Act, which set aside a small percentage of the Federal aid highway funds that went to each state to be used for planning and research.

This encouraged the very close link between the research capability in each of the states and the practical problems that the agencies had to solve in each of those states. In that sense, it is somewhat similar to the land grant system, although it wasn't aimed specifically at the educational institutions.

In addition, the Federal Highway Administration itself has established a central highway research capability to deal with some central overlapping problems amongst the states. Over the years, the states have developed several channels, cooperative channels, through the Transportation Research Board and the National Cooperative Highway Research program, where they have pooled their own resources to take on problems of common interest.

I think these kinds of devices have served the industry well, but nonetheless, many of the managers of the highway sector were finding four or five years ago that there were some gaps in this overall structure; some things that should be happening weren't happening.

There had been a significant turnover of managers not only in the Federal Highway Administration, but in many of our states. As the State DOTs, evolved the top management often reflected a broader disciplinary background than when engineers used to find themselves promoted into the top jobs in highway agencies.

A lot of these new managers, I think, brought a lot of new skepticism about whether our highway systems were serving us well, and whether research was tackling the highest priority problems. They commissioned a panel of university experts and practical operating officials from highway agencies, from industry, and from universities to think through the problem. They concluded that there was, indeed, a gap in research relating to some of our most costly and pervasive problems, and they recommended a very highly-targeted research program that focuses on six topics, fairly earthy things like asphalt; concrete bridge components; cement and concrete; control of snow and ice; maintenance cost-effectiveness and pavement performance.

The state officials enthusiastically endorsed this and went further to develop a very detailed, 500-page research plan that spelled out what we could do in these different areas. They also worked with the Congress to secure funding for this program, which happened when Congress passed the highway bill this past April.

There are a few things out of this experience that may have some relevance to an infrastructure program generally.

One is that developing a realistic research plan is a difficult, time-consuming process. We need to bring together the people who work in the field and know what the practical limitations of working with different materials and technologies are, with the research expertise on what is technologically achievable under ideal conditions.

Second, I think you have to have very strong management involvement in this process. I think many of the changes that might come about could require changes in standards, procurement practices, training procedures, and recruitment procedures. Unless management recognizes that such changes are coming and challenges the developers of new products to be realistic in terms of what management burdens their products will place on these organizational constraints, then nothing will happen.

I think it is important to have management involved throughout. The research agenda in the case of the Strategic Highway Research Program is, indeed, a very dollar-driven one. The problems that are being worked on there are ones that promise large savings in the amount of money we spend in the highway program. But they are not necessarily the ones that closely coincide with the existing concentrations of research expertise.

The program I am working with is not a comprehensive one. There are many other aspects of highways and many other aspects of highway materials that are not addressed. I think this concerted focus on a few things can help yield results.

We are just beginning, as I mentioned. The program was authorized in April, and it is certainly premature to conclude that this is a successful approach, but I think there are some aspects that are positive.

One is the positive reception of our program throughout the industry, even in agencies whose budgets are, in effect, somewhat smaller now because they are supporting this program, and among contractors that would have had somewhat more funding had this program not been enacted. All these groups, are, nonetheless, supporting this program. I think it suggests that when a carefully-crafted program is put in place, there can be overwhelming and positive endorsement and response.

I think that by strategically focusing on a few specific aspects of infrastructure and bringing forward all the organizational perspectives that bear on it, we can overcome some of the barriers that surround some of our more pressing problems.

I believe the organizations that use infrastructure R&D should share in its financial support. I think this is not only fair and efficient, but I think it is also a necessary discipline in bringing together the combination of management commitment and technical expertise that is necessary for success.

Our program, and, I think, effective research on many other aspects of infrastructure, require that some critical mass of resources be available. We are dealing with so many variations in materials and climatic demands and other demands, that very often, nothing meaningful can happen unless you have the capability to explore a significant variety of designs, materials, climates, and other conditions.

There needs to be a fairly concerted management push on these problems. Mr. Chairman, those are a few observations that I would put before you for your consideration. I thank you for your interest.

Senator **MOYNIHAN**. Thank you, Doctor.

Senator Graham, would you like to ask questions?

Senator **GRAHAM**. Thank you very much, Mr. Chairman. I want to express my appreciation to all the members of the panel who have given very excellent remarks. I would like to address a question, first, to Dr. Epps.

I might say, Dr. Epps, your name is a very famous one in our State. I would like to check your lineage and see if you are related to some of our famous historical Floridians.

I am a believer in the principle of leadership by example. That is, if an institution purports to want to lead, it should, in its own actions, demonstrate a commitment to those principles which it thinks is important. In that regard, you emphasize the roles of higher education institutions as leadership roles.

What if we wanted to visit campuses of universities and colleges in the United States where they had applied the principles that you have talked about, the innovation and new design, new applications of transportation technology, construction materials, et cetera. Where would you recommend we go?

Dr. **EPPS**. I would certainly like to include the University of Nevada, Reno on that list.

In the area of transportation materials, I think we have an outstanding program, although smaller than some throughout the country. It addresses the needs of our communities and our region.

Senator **GRAHAM**. What I am talking about, to focus the question, is I am talking about where the university itself has incorporated those new concepts in its own active, not to denigrate the importance of it telling other people what they ought to do, but showing its seriousness of commitment by serving itself as a role model of innovation and application. Where, in addition to Reno, where else should we go?

Dr. **EPPS**. I will mention the other schools, then. Texas A&M University has had an outstanding program. Support from the Texas State Department of Transportation through the highway planning and research program over the years has produced this outstanding program.

Senator **GRAHAM**. I am talking about on the campus at College Station Texas.

Dr. **EPPS**. That is right.

Senator **GRAHAM**. What would we see there that should be stimulative?

Dr. **EPPS**. You would see research laboratories; you would see undergraduate and graduate programs; you would see continuing education programs.

Senator **GRAHAM**. Would we see, for instance, at the buildings at Texas A&M, some applications of new materials and technology that we could say, "This is what other communities ought to be coming and looking at"?

Would we see some transportation systems that would strike us as novel and creative serving that campus?

Dr. EPPS. You would see new materials; you would see highway appurtenance improvement projects going on; you would see the continuing education element; a wide variety of things that you would, I think, be pleased with in terms of solving the infrastructure problem. That is also one university system that has bridged the gap, if you want to use bridge the gap type of terminology here, between the public works local government agencies and the universities. It is one of the few in the countries that have done that.

Other outstanding programs are the University of Wisconsin in terms of their training programs; Purdue University; University of Illinois; University of Texas are some of the others that come to mind.

Senator GRAHAM. If I could use an example in another area, and I have had a long-time interest in education, and one standard that I have used for a good college of education is: Do the other colleges within that same university seek out the college of education for pedagogical assistance? Do they find it to be a place which has sufficient intellectual content that professors of physics or civil engineering would go to the college of education and say, "I need some help on how to be a better teacher? Help me now; maybe you have given us heretofore."

Dr. EPPS. I am not sure I am in a position to answer which colleges of education.

Senator GRAHAM. I am just using that as an example. I want to use it as an analogy in infrastructure.

Where are universities, and you have mentioned Texas A&M, the University of Nevada, at Reno; Wisconsin?

Dr. EPPS. Wisconsin; Purdue.

Senator GRAHAM. As places that stand, themselves, as role models.

I think, Mr. Chairman, it might be worthwhile if we were to try to flesh out that list of universities that themselves are role models and see what they are doing and why they are doing it and what their own lessons are.

Senator MOYNIHAN. I very much agree and speak to a earlier time when we had some of the same things here, the same and different, in the 1950s, and it happened in a combination of things. I became very much involved with the issue of automobile safety. This was at Albany.

I was Acting Secretary for the Governor, and I came upon a young man who just arrived at our school of public health, at our Department of Health, who had done his graduate work at MIT and then had gone to Harvard School of Public Health and had picked up the technology; was pretty well-developed in air safety and it was basically crash technology. It had a fairly high order; you could get very interested and very abstract in terms of energy transfers and the human systems, or you could get very simple and elemental, like feedbacks. He had a full spectrum from very advanced to very elemental things.

At that time, automobile safety was a very real problem. This was very salient. We had reached a point which may not be receding, whereas in the mark of an industrialized society, you measure how far industrialization has gone by after age one what was the year when you cut off the largest number of deaths that were not from what were called accidents.

The whole point of the word "accident" is—it is just a pre-scientific word. These aren't accidents, these are incidents in a system, and you can analyze them and predict them and so forth.

I got involved with this man—he was a very distinguished man—last night. He wrote the first papers in this field. We did some mathematics, he much more than I, and one of the things we discovered is, here you have a point where accidents are the leading cause of death for males between age 1 and age 37.

How many people are working on this subject in this country? We came to the explanation that at this point in the previous 50 years there had been as many as two people working full-time year-round in this field that had no scientific reputation; they had no prestige.

Any of you gentlemen here will say that the allocation of intellectual resources goes to its fashion. You don't get Nobel Prizes for cutting down the number of highway deaths; you don't get any prize. The whole of the industry would be resistent, and the university was a bit of a scandal.

The schools of health, one man at the Harvard School of Public Health was interested in this, and only one man. Medical schools weren't interested in this at all. It didn't interest them at all that their emergency rooms were filled with people with their guts spilled out and blood gushing and so forth. It was not medicine. You may have the same condition here.

I just want to make a point that it is very clear that the elemental things like robotics. We haven't had enough prestige to acquire energy. I know that I can say with Dean Epps, at Wrinzel Polytech in Troy, New York, they have got some pretty healthy things going, but not much.

Anyway, I interrupted you.

Senator **Graham**. Let me ask another question to any member of the panel that might wish to comment. Carrying on with this concept of leadership by example, the Federal Government is, I would imagine, by several orders of magnitude, the largest user of infrastructure in the country. I am not talking about when the Federal Government provides money to somebody else; I am talking about the Federal Government builds a military base and maintains the enormous capital investment that it has.

What would be your evaluation of the level of creativity, training of personnel and role model example which the Federal Government currently represents? If you were looking for the best practices in infrastructure, would you look to the Federal Government as an example of where they are being put into place? If not, what could the Federal Government, as an institution, do for its own purposes and to serve that role as a leader by example? How could we reform ourselves to be more of a model?

Mr. **Grant**. I would say that one thing that we have always talked about but never have done a good job in is technology transfer. I think the Federal Government can provide some leadership there.

Throughout the country at all levels of government and public agencies, there is innovation; there are startling new developments that save money and that could give us safer public work structures. I would think that the Federal Government could not only use those in some of their own responsibilities for building public facilities, but by encouragement, perhaps providing a forum for the improved exchange of that kind of technological development, which would serve our Federal government well.

Senator GRAHAM. What would be your, if you were giving a grade on a score from 0 to 10, with zero being abject failure and ten being perfection, where would you evaluate the Federal Government today in the area of technology transfer?

Senator MOYNIHAN. That is a megathought.

Mr. GRANT. I would say maybe in the middle.

Senator GRAHAM. 5.107?

Mr. GRANT. More or less.

Dr. EPPS. I would like to address that question, as well, Senator.

My experience has been mainly with pavements and pavement materials. I see new technology, such as recycling old pavements, modification of our existing asphalt binders with chemicals, new pavement designs, principally based on mechanics, a little bit slower in terms of their implementation into the Federal network.

You will see many state departments of transportation, through their university and other groups, leading the charge by, say, two to three years in this area, and then you will see the Federal agencies a little bits slower in response to pick up on these research efforts and, in some cases, implementation.

I think the Federal Government has done a much improved job in my area of expertise in implementation than they did five or ten years ago. It is much improved today as to what it was ten years ago in terms of trying to get the technology to the practitioners in the field. I would probably rate them above the 5.1. I think it is more in the 6 or 7 area, not that we don't have a lot to do.

Dr. KULASH. I am sure the performance of different aspects of the Federal government may vary in this respect, but the agencies that I am most familiar with—the ones that deal with pavements—certainly deserve to be graded well better than 5.

There are a number of Federal agencies, including the Park Service and the Forestry Service, in addition to the Federal Highway Administration, that have responsibility not only for developing better roads, but for actually building them. I think all of these agencies have aggressively tried to spread that information to other user agencies, sometimes ones that go beyond their own program recipients.

The Corps of Engineers, for example, has been fairly active in promoting better paving practices to local governments. The Federal Highway Administration is very active in working with state and local governments.

I would grade them quite high in this respect. If there is a limitation, I believe it is closer to the point that you made about safety research earlier, namely there is a lack of prestige in working in some of these areas, and a lack of strong support. This area of public works R&D is very underfunded when you compare it to R&D in any other industry.

I think those are the factors—not the lack of good will or good the intentions of the people in these agencies.

Senator **Moynihan**. Senator Reid, did you want to ask questions?

Senator **Reid**. Thank you very much, Mr. Chairman.

I personally congratulate you for holding these hearings. I believe that it will be through your leadership that we can make some headway in doing something about the deteriorating infrastructure we have in this country.

I have enjoyed working with you on this committee, and I am reminded of how happy you were when we were able to get something done with the Federal Triangle facility that we are going to build there.

Senator **Moynihan**. Yes.

Senator **Reid**. I look forward to the day when we are going to make strides about this larger Federal Triangle that we have, this country that we have that is really falling apart. I can remember when, as a young man, I would travel to the East, and I would note the condition of the roads. They were in bad shape, and in my smugness, I would go back to the West on these beautiful roads that were so nice.

Well, they are not that way anymore. We have caught up with the East. The roads are bad all over this country. The freeway system which was put into place that began during the Eisenhower years is now an old system, and even in States like Nevada, the roads, the beautiful freeways, are no longer beautiful freeways.

They need to be replaced in many, many areas. So, Mr. Chairman, I look to you for leadership in this area, and I think you brought out such a poignant point when you talked about the example you have about anyone concerned about highway safety. Dean Epps has talked about a man by the name of Bob Mendenhall who received a Federal patent for recycling asphalt.

Now, your mind's eye, you can picture what a great advancement that that is, that this asphalt that once was torn up by the thousands of tons and put in dumps is now being reused.

But the interesting thing, and I know Bob Mendenhall very, very well, a fine man, but he is an uneducated man. Here is a man who did this based on experience. He had no education. He didn't know anything about math and science. He did it based on practical experience.

I think that is wonderful that he was able to do that, but it shows to me the technological advances that could be made if we would devote just a small fraction of the money that this government spends on other things to our infrastructure, which is collapsing.

I mean, forget about the magazines, the front covers of Time, Newsweek, U.S. News. All of them 5 years ago talked about our deteriorating infrastructure. Well, the pictures may have disappeared, but the infrastructure is just as bad as it used to be. I think a lot depends on this Committee to do something about it. I have been impressed with the testimony here today.

Dean Epps; I was especially impressed perhaps because I know you better, but just some things brought out in your written statement such as: We have no place where we have large structures where we can have large modeling, for example, with bridges. A lot that we do with bridges are a hit-and-miss proposition, because we don't have a place in the United States to really study bridge engineering.

We have a little mechanical engineering and a little civil engineering that all goes into it, and you will note that Dean Epps in his testimony talked about the fact that we should have a degree in public works engineering.

We have a shortage of professors. We, of course, need to be concerned about how to pay for all this, but Mr. Chairman, the hundreds of billions of dollars that we spend on defense, and all of us up here have voted for programs for hundreds and billions of dollars worth of things, but we have to redirect our priorities a little bit and recognize that to have a strong, sound, secure nation, we also have to have a strong, secure infrastructure.

That is why we developed, in the Eisenhower years, or started, the national freeway system. That was part of our defense program. I think we have kind of lost sight of some of the things that make a strong——

Senator MOYNIHAN. The national defense highway?

Senator REID. That is right. We have things that stand for a strong defense other than things that explode and make sounds in the air.

But the defense of this Nation, we have to get to some of the more basics. I don't mean to take a lot of time talking about my philosophy, but you know, there are so many interesting things that can be done. In Nevada, manufactured are highway signs that when you knock them down, they pop right up again. They were all made in Nevada. That is an idea that would save this country lots and lots of money.

Mr. Chairman, I personally look to you for leadership in this Subcommittee and this Full Committee, that we as a Congress must do something about this infrastructure.

Senator GRAHAM. Senator, I just apologize. It is my time to preside over the Senate at noon. I want to express my joinder and remarks that have just been made by our good friend Senator Reid, and, again, express my appreciation to this and the preceding panel and to you and look forward to more instructive sessions as we have had this morning.

Senator MOYNIHAN. You are very generous.

Senator REID. Mr. Chairman?

Senator MOYNIHAN. Yes.

Senator REID. I appreciate comments from Senator Graham.

One last thing: I think that this Committee next year is going to have to be very brave in the authorization process and start authorizing money for some of the things that we talk theory about, and I will join with you in doing this.

Senator MOYNIHAN. Thank you.

Dr. Tucker, apprehension is a great source of social energy, as you probably know. I think President Eisenhower got the interstate system by saying, "We need it to have our missiles travel around from one place to another." Missiles went up in the air, but you had to bring them somewhere by truck.

Are the Japanese developing the next generation of machines that will be used to build highways and bridges and maintain them and such things? Are their robotics about to appear, and will they be appearing with Japanese managers and firms?

Dr. TUCKER. I think there is no doubt about it, Senator. They are much further ahead than anyone else in the world in development of construction robots. Some of these are in their third or fourth generations. I am sure they have others they were not willing to show me. I think the things I have seen are the ones they are all ready to put on the market, so to speak.

All of these have a unique characteristic in that they take about half the time of the common work force. It stands to reason that if a Japanese company comes here and bids on a public works project, they only need half the labor that an American firm needs, then they are going to get the bid. For us to assume, then, that we can put in robots and American firms learn to use them, you must realize, they are always developing new ones, so our firms are always going to be behind our technology as long as they have them.

Senator MOYNIHAN. This has already happened?

Dr. TUCKER. That is correct.

Senator MOYNIHAN. They have production lines of them?

Dr. TUCKER. That is correct.

Senator MOYNIHAN. And we, where are we, now?

Dr. TUCKER. We have virtually no work of that type in this country.

Senator MOYNIHAN. Senator Reid, did you hear that? That is as if we were saying they have an internal combustion engine and we have horses.

Dr. TUCKER. That is very close to the state of this particular industry in terms of construction automation. I should qualify this. The reason our firms can compete with the Japanese at this time is because we have much better management systems than their companies do.

Senator MOYNIHAN. But you are telling us they are sending people over all the while?

Dr. TUCKER. That is right. They are sending students to our universities. They are joint venturing our companies. They are going to catch up in that respect very shortly.

Senator MOYNIHAN. Also, construction is one industry that has not gotten international, quite. It is beginning, right?

Dr. TUCKER. It is beginning now.

Senator MOYNIHAN. We are used to the idea of our going abroad and building things in Saudi Arabia. As this Committee has said several times now, for the last 3 years, the United States Corps of Engineers has been carrying out more construction in Saudi Arabia than in the United States.

So we are used to sending people, and you go to Saudi Arabia, and I went over once just to see what the Corps was doing and Korean firms and so forth.

But the idea of Asian firms or whatever coming here is new, but there is nothing to stop them, is there?

Dr. TUCKER. We have Japanese firms. They are brought into the United States and are increasing every year programmatic. The Korean firms are here, the Germans, the Italians, the British, some of them by buying American companies and taking them over. Some of them by competing with us in the United States.

Senator MOYNIHAN. Coming in. I am sorry.

Dr. TUCKER. We have got to realize that we represent one-third of the total world construction volume here, a very lucrative market.

Senator MOYNIHAN. Nice point. We represent one-third of the world construction market. We are here working away with a pick and shovel, and graders and tractors and dump trucks, and over there are people who are already in the third and fourth generations of robots that can do this work and are ready to start bringing them over and bidding.

Dr. TUCKER. That is correct.

Senator MOYNIHAN. That is what it means to be invaded by a superior technology. Would the panel agree this is a very serious thing. What do you all think?

Mr. GRANT. I certainly agree that if we don't change our way of doing things that we are going to be caught up in just what Dr. Tucker has described.

Senator REID. Mr. Chairman?

Senator MOYNIHAN. Yes, sir.

Senator REID You raise such a valid point, and I know the time is gone, but we have lived in the past several years in this era of let the private sector do everything. The Federal Government is going to have to become involved in this or we are not going to be able to compete, and there is no other way around it. You may not like it.

Senator MOYNIHAN. You know what we are going to do, my good friend? We are going to solve this problem by protectionism. "You can't have foreigners coming in here and doing this. If you couldn't have foreigners coming in and working on public works, then Moynihan would never have arrived to build the railroads."

That is our time, gentlemen. We are going to have to cut this off. I would like to ask that the hearing record remain open for 30 days for submission of additional written testimony and follow-up questions and answers.

Can I ask you all, though, and Dr. Kulash, now, we have given you $30 million to help find out about these things. I was a little bit surprised at a recent agenda that just went to the pouring of concrete. You have got enough money and enough of you, you are just getting started. What do you say you move a little bit in this direction, all right? We put that into that last highway bill.

We represent one-third of the world's construction market, and we are waiting until either we are going to be competitive in this market, or we are going to see not just the foreign automobiles on those highways, but they will be foreign highways, too. And I am not against trade. I am just saying, it is our not being competitive.

I am not against specializations, and you build small machines, we build large machines, things like that. But not you build all the machines and you pick up the things. Right now, this whole business of a new technology in construction is very real. We sit here in hearings; you can see the next 30 years in front of you. Other people doing the thinking and the innovating. If we just stay in touch with this, I know you will, Mr. Epps, and I know you must, sir.

Mr. Grant, we would very much want your association, and maybe, Dr. Tucker, you could send us a long letter about what you have seen in Japan and what you think we ought to be doing.

Dr. **Tucker**. I would be pleased to do that.

Senator **Moynihan**. We have some very emphatic numbers on the proportion of the research that is going into infrastructure. That is .17 percent, isn't that what you said, Mr. Epps?

That is the way losers work, right? That is the way losers work. We think of this as a low-tech industry when other people are making it a high-tech industry, and that is what happened when farming stopped being a matter of ploughing and humping and working with your shoulders and started being irrigation and using lasers to see that you have just the right plantings, conditions, and that the lettuce comes up at just the right time, and the next thing you know, agriculture is transformed.

I thank you very much. I am sorry we have to close. It is a Senate rule, and we appreciate it very much, and thank you, Senator Reid.

[Whereupon, at 12:05 p.m., the subcommittee was recessed, subject to the call of the Chair.]

[Statements submitted for the record and responses to additional questions follow:]

Testimony
by
Lawrence Dahms
Chairman
Committee on Infrastructure Innovation
National Research Council

Before the

Subcommittee on
Water Resources, Transportation, and Infrastructure
Committee on Environment and Public Works

October 21, 1987
Dirksen Senate Office Building, Room 406

Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to appear before you this morning. I am the Executive Director of the Metropolitan Transportation Commission for the San Francisco Bay Area; however, I appear before you this morning in my capacity as Chairman of the Committee on Infrastructure Innovation, of the National Research Council. The committee's full roster is attached to this testimony. As you'll note, its composition includes people who have managed infrastructure systems such as transportation and water resources at various levels of government, who think about financing infrastructure programs, and who run large research organizations focused on components of infrastructure.

The Committee on Infrastructure Innovation was created in response to a request by the National Council on Public Works Improvement that the National Research Council examine:

- promising research areas for the technological improvement of infrastructure;
- factors governing the adoption or rejection of technological innovations; and,
- the means for developing and carrying out a national research agenda to foster innovative research for infrastructure systems.

Our report responding to that request was delivered to the National Council on Public Works Improvement at the beginning of this month and made public yesterday. I am pleased to submit that report for the record with this prepared testimony. The Subcommittee, I think, will recognize that the National Research Council committee faced a difficult charge. It was necessary to first consider whether a research program focused on infrastructure had value. After agreeing that it will have value, the committee had to define an ambitious research program in an area for which definitions differ and for which there is no natural constituency -- in government, industry, or academia.

Those difficulties limited what the committee could do in its five-month life. However, the committee did agree that a research effort that takes a synoptic view of infrastructure is needed; that this research must complement the research already under way in transportation, waste treatment, and other modes subsumed under the phrase "infrastructure;" and that a continuing institutional approach to invest this overall research effort with focus and coherence is needed.

The exact nature of this institutional focus is at this point indeterminate and warrants an intensive examination of financial support mechanisms, organizational structure, and scope. That examination is the next step recommended by the committee: a two-year implementation effort to create a comprehensive research agenda in concert with the relevant constituencies in government, industry, and academia.

The committee believes quite strongly that a continuing institutional focus cannot be created Athena-like, but rather requires cultivation, if it is to flower and flourish.

The conclusion of this study--that a research program taking a "global" view of infrastructure is badly needed--is based on the committee's findings that there are both research opportunities and barriers to their application that transcend the various modes of infrastructure. The committee's caution that more work is needed to construct an effective program properly is based on recent experiences with other and comparatively more modest programs directed at specific modes of infrastructure, such as the Strategic Highway Research Program. Dr. Damian Kulash will tell you more about that program this morning. Creation of the Strategic Highway Research Program, which was formed to address problems in one segment of one mode, took five years and considerable resources--which gave our committee pause in thinking about how to create a research effort relevant to all modes of infrastructure.

What are the opportunities that transcend these modes? What are the barriers to their use? And what is the nature of the implementation program recommended by the Research Council committee?

The committee identified illustrative opportunities that flow across the various modes of infrastructure in materials sciences, information technology, urban and regional planning, and nondestructive evaluation. For example, taking a close look at nondestructive evaluation, the committee found a rich lode of applications of this research technique to problems afflicting virtually all of public infrastructure.

Nondestructive evaluation, or NDE, refers to a family of procedures employing probing radiation such as x-rays, ultrasonics, and radar for performance monitoring and improving system reliability. One of the most far-reaching opportunities for employing NDE research is in the evaluation of concrete materials. Concrete is ubiquitous in infrastructure--in highways, buildings, and piping for water and wastewater. In all these uses, flaws in the concrete--e.g., air pockets, cracks, corrosion--can be serious problems. Recent research on flaw detection that combines acoustic methods, digital signal processing, and computer-based analysis has led to the impact-echo, stress-wave propagation technique, which is capable of identifying certain internal interfaces such as cracks, grouting joints, and voids in concrete. The reliability of this technology needs more evaluation, as well as the development of field test systems.

Permeability is the most important characteristic for concrete's long-term performance, because this affects the rate of infiltration of such undesirable elements as chloride ions, which in turn affects corrosion of the reinforcing bars or wires in highways, bridges and pipes. NDE methods are needed for in-situ measurement of permeability.

Assessing the condition of tendons in post-tensioned precast concrete elements warrants research. NDE methods should be sought which determine whether tendons are protected by grouting or have corroded. New NDE methods for assessing conditions of roadways are needed to provide information on the subgrade as well as the pavement. For new construction, sensors should be developed that can be embedded in the structure to allow continuous monitoring of structural conditions. Also, during new construction, NDE should be developed to monitor the compliance of construction with accepted standards and contract specifications.

I've focused on the NDE example because it shows the potential of a single research subject to address problems across several modes of infrastructure and represents potential cost savings to the nation. While the intended applications are certainly not glamorous, this subcommittee will appreciate the economic potential of the successful use of these methods--in calibrating the condition of infrastructure, maintaining it, and guiding its replacement. The committee offers more examples in its report; and is unanimous in its opinion that a longer and more intensive examination of other opportunities will enormously expand the agenda for a program focused on infrastructure.

While many opportunities exist, such a program is also faced with many barriers. It is arguable that the barriers identified by the committee provide an even stronger imperative for creating a national focus for infrastructure research. The barriers common to infrastructure modes are familiar and formidable. They include the large scale of public works projects in contrast to the limits of the ability of local communities to maintain and enhance their infrastructure systems, the chilling impact of wary buyers on the potential market for adopting innovations, and the fragmented institutional structures within which infrastructure systems are developed and operated.

These and other barriers must be responded to in any attempt to stimulate innovation with regard to infrastructure systems.

First, a national effort to encourage more and better research is required to ensure that research needs and opportunities are identified systematically and comprehensively, to encourage research efforts where they now lag, and to sponsor cross-cutting research that is not adequately pursued within the research communities of the individual infrastructure modes.

Second, steps must be taken to ensure that the beneficial results of such research are transferred to and adopted by managers, suppliers, and users of infrastructure systems. Perhaps the chief lesson to be learned from past efforts in technology transfer is the need to involve potential adopters early in the research and development process. This ensures that the research focuses on areas of high priority and that the development phase results in useful products that can be more readily adopted by the user community. Experience also shows the importance of an in-house research and development capability on the part of potential adopters. Accordingly, it makes sense to use and strengthen existing research capacities within the infrastructure modes rather than to supplant them.

For that reason, the institutional strategy for stimulating research and innovation in infrastructure, outlined in the committee's report, has been designed specifically to involve infrastructure operators and suppliers and to build on the existing research capacities of the various infrastructure modes.

Third, the barriers to and incentives for innovation should themselves be the subject of public policy research as part of a national infrastructure research agenda. Such research would be aimed at identifying strategies for overcoming barriers and improving the transfer of innovations to the primary operators of the nation's infrastructure, generally state and local agencies.

These factors led to the committee's conclusion that a sustained institutional focus for a program of infrastructure research, development, and technology transfer is needed. To bring this program into being, the committee recommends that a two-year implementation program be initiated immediately, to explore with the many constituencies involved in the infrastructure system the prerequisites to creating an organization that would provide the stimulus, focus, and coherence for a sustained effort in infrastructure research. The committee believes that the tasks of this two-year implementation program should include:

- Defining the managerial structure, financial mechanisms, and limitations under which this organization should operate;
- Developing a national agenda of research and development for infrastructure systems that identifies the current gaps in research and notes research opportunities for addressing problems common to several modes;
- Bringing into the program the talent and expertise of the various existing modal research groups;
- Establishing minimum goals and criteria for research and implementation; and
- Informing federal agencies, the user and professional communities, and the public about the opportunities for research in building a more effective infrastructure system.

The committee has no illusion that the continuing effort to be shaped by the two-year examination will in itself solve the difficulties of infrastructure innovation. The need, the opportunities, and the required resources are all too vast. However, it believes that this continuing effort, if well founded, can become the nation's catalyst for:

- Encouraging the development of necessary research programs where they are deficient,

- Giving attention to promising long-term research projects which do not now have readily apparent constituent interests; and,

- Fostering research broadly applicable to all parts of our infrastructure.

The committee, therefore, offers the Congress its recommendation that an implementation program be initiated to provide the problems of infrastructrure systems with a continuing focus, and the venue to constructing an effective research program that applies broadly to the system in which we travel, do our work, educate our children, obtain our water, and remove our wastes. Constructing that program will be frustrating, at times contentious; and it will require continual good will, patience, and resources. If done well, the committee believes that the United States can gain enormous benefits in the quality of the services that support the environment in which Americans will live and work in the next century.

Mr. Chairman and Members of this Subcommittee, this completes my testimony. I would be delighted to respond to any questions you may have. Thank you for this opportunity to testify before you today.

* *

COMMITTEE ON INFRASTRUCTURE INNOVATION

LAWRENCE DAHMS, (Chairman), Metropolitan Transportation Commission, Oakland, California

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November 18, 1987

The Honorable Daniel Patrick Moynihan
Committee on Environment and Public Works
SD-458 Dirksen Office Building
Washington, D.C. 20510

Subject: October 21 Hearing

Dear Senator Moynihan:

Thank you for the opportunity to expand further on my testimony before the Subcommittee on Transportation, Water Resources and Infrastructure, on October 21, and specifically to elaborate on an agenda for a concerted research effort on infrastructure. Before doing so, I do want to join with others in thanking you for your leadership on an issue that challenges political will and national resources. I was heartened, as I'm sure you were, by the near unanimous agreement of the witnesses on the need for an institutional focus, in order to create a research program on infrastructure that is effective.

Mounting that program will not be easy. As observed in the report of the National Research Council's Committee on Infrastructure Innovation, an infrastructure research program faces enormous difficulties, if one compares it, for example, to the genesis of the Strategic Highway Research Program. SHRP is also an infrastructure research program, but it has a smaller target, highway materials, and it deals mainly with one coherent and well organized constituency. Still, it took almost five years to create SHRP. That lesson weighed on the committee, and shaped its recommendation for a two year effort to define a comprehensive research agenda and to suggest how it might be implemented.

What are the possibilities that excite us? What are the ideas, the concepts, the new ways of doing things that can help the nation maintain and modernize the system that serves as the stage setting for our economic and social lives? Many are given in the report of the Committee on Infrastructure Innovation, **Infrastructure for the Twenty-First Century: Framework for a Research Agenda.** These are necessarily illustrative opportunities; but a glimpse of what is possible is in the Committee's detailed examination of just one new approach--that of applying a suite of techniques for nondestructive examination (NDE) and monitoring of infrastructure systems, summarized in my testimony and amplified considerably in an appendix to the

The National Research Council is the principal operating agency of the National Academy of Sciences and the National Academy of Engineering to serve government and other organizations report. NDE techniques are useful for maintenance, but more importantly, they allow wholly new design concepts and materials to be considered.

Our report, especially Chapter 2, offers illustrations of opportunities for infrastructure innovation to be explored in the research focus envisioned by the committee. What I want to emphasize in this letter is that many of the opportunities given in the report fall within technical areas in which the United States has enormous strength, which are being vigorously exploited in the commercial sector, but whose application to public works infrastructure is weak at best.

Three areas exemplify this point--the technologies embodying new understanding of biology at the molecular level, the ability to create new materials to fit unusual applications, and the use of computers and telecommunications to transmit and process information.

Biotechnology: Recent research has been conducted with bacterial agents which "concentrate" hydrocarbons into a recoverable product. Improved oil recovery from depleted fields is one result. This research could be extended to deal with solid wastes and water pollution. For example, accelerated decomposition of solid waste might be possible with genetically engineered bacteria. This innovation might delay the impending crisis in solid waste disposal due to the lack of available landfill sites. Further, biotechnology obviously applies to water pollution control. Possible applications include poison-resistant bacteria for centralized wastewater treatment facilities; organisms capable of digesting, trapping, and in effect neutralizing toxic or otherwise hazardous materials; and, in general, biological organisms capable of neutralizing wastewater contaminants from both concentrated and dispersed sources.

Materials Technology: This technology is a U.S. strength, but sophisticated concepts embodying engineered materials have not been widely applied to roads, streets, and bridges. While there has been a revolution in the materials sciences in the past several decades, the materials of public works infrastructure remain classical: concrete, asphalt, wood, and steel. The point here is not simply an inertial use of the same materials, but a failure to exploit materials whose properties can be adapted to function, an advantage that defines engineered materials. Thus, there is available a large suite of polymers, glasses, ceramics, and superalloys; membranes, composites joining the properties of multiple materials, and coatings; and for these materials both advanced factory fabrication and in-situ processing techniques.

As our report notes, high-strength-to-weight nonmetallic woven fibers and polymer-impregnated fabrics have already made a major impact in architectural applications for sporting and temporary facilities. Applications to infrastructure warranting research include replacements for steel cable used in suspension bridges and prestressed concrete structures, and for tunnel liners, pipelines, storage tanks, and highway pavement foundations.

These new technologies, I should emphasize, not only make it possible to do new things, but also to maintain, and often improve substantially, what is already in place. Offered by the materials revolution, these techniques can be used to recondition or otherwise strengthen and protect materials already in place, upgrading structural performance and increasing service lifetimes. For example, polymeric sprays that penetrate and harden in place, and coatings and linings applied to pipes and structural components, offer promising applications of new technology.

Information Technology: This technology embraces both computers and telecommunications and, more generally, the transmittal and processing of digital information. One of the most important applications will be the ability to model the behavior of large complex systems, both during design and operation. This modeling--simulating substantial changes in transportation or water supply systems, for example, without actually building them--will enable us to test significant departures from the conventional without incurring enormous costs and risks.

Further, centralized computer traffic control is being applied in several cities to relieve the pressures for more freeway construction, by converting arterial streets for short periods into limited-access roadways. These newer systems replace older fixed-signal synchronization schemes with adaptive control based on traffic demand at particular points and times of day. While the underlying principles are certainly not new, recent advances in computer science and technology make it possible to apply these ideas to dozens of intersections, and, with additional research, to entire regions.

Also, computerized monitoring of the condition and performance of infrastructure facilities remains jejune in its application. Thus, new bridges can be instrumented to provide the engineer with continuous information on structural integrity, analyzing that information, presenting it in understandable formats, and alerting managers to maintenance and other needs.

Simply knowing where infrastructure is located and its design will be of incalculable value to older cities, layered by decades of construction, reconstruction, and maintenance. Even when such information is available, coordinating it to be truly useful awaits the provision through research of inexpensive and rapid methods of entry, processing, and display of design data.

Telecommunications offer enormous opportunities. Traffic signal systems for urban mobility will depend on reliable telecommunications to link controls at intersections, both with one another and with the central computer. Nondestructive evaluation techniques for monitoring structures remotely will likely use telecommunications to collect measurements from sensors embedded in the structures and transmit the data to the engineer.

International Aspects

In the hearing, you and your colleagues quite rightly noted the competitive threat posed by the serious attention that other nations are giving to innovative infrastructure systems. International aspects are not treated in the report, but the Committee did examine both organizations in other countries dealing with infrastructure systems and innovations arising out of research being done outside the United States. I have included some information from my own notes here that you may find of interest.

Both the organizations and the results are impressive. For example, Japan has created the Public Works Research Institute, which conducts research in all infrastructure areas. It has a staff of 487 (1984 numbers), of whom almost 65 percent are engineers. Similar efforts, concentrating on infrastructure components such as construction and water resources, are in place in China, Britain, and other countries.

As to innovative approaches, there is a long list. Some foreshadow market competition, as discussed in the hearings; and some may be adaptable to our own needs, but require the leavening of a competent research endeavor to make them work effectively in the U.S.

Traffic Management. West Germany, which has a much higher vehicle density than the U.S., has taken very innovative approaches to managing traffic flows. One system includes signal receivers and transmitters in autos, trucks, and traffic light intersections. Such devices communicate through relay stations to a central traffic control computer. The computer, in turn, can adjust the timing sequences for traffic lights, advise drivers of the optimal routes, and direct traffic away from road blocks and emergency situations.

Direct Filtration. Many countries are examining the use of direct filtration plants and "variable declining rate filtration" to control water flows. While the technology was partly developed in the United States, it has been applied vigorously in other countries, such a India, Columbia, Brazil, China, and Taiwan.

Management of Water Resources. After a devastating North Sea Storm in 1953, the Netherlands launched the construction of a system that would be impervious to future storms. This was the Delta Project, and it was massive. It included, for example, the construction of two work-harbors, three artificial islands, an armada of specialized floating construction barges, and much more. The project served to protect the Netherlands against another devastating storm; and it has made that country a world leader in hydrology.

There is much more going on internationally; but I think the point is made, that other countries are creating and applying innovative approaches to infrastructure problems. There is of course a great deal going on in the United States, but the effort is incommensurate with the need, as you have noted many times.

There is in fact no dearth of ideas. The main difficulties lie in introducing innovative approaches that are effective, both in scale and in result, and that surmount political, economic, and historic barriers. Indeed, these barriers to innovation--jurisdictional conflicts, legal pitfalls, liability awareness, adherence to traditional standards, and large scale, for example--are likely to be a more formidable problem than defining the opportunities. The awareness of these barriers by the Committee, many of whom have spent their professional lives struggling to work with and around these barriers, is what led to the recommendation for a careful and systematic implementation effort.

I hope this letter is useful to you, and I would, of course, be pleased to respond to your comments and additional questions.

Sincerely,

L D Dahms

Lawrence Dahms
Chairman
Committee on Infrastructure
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November 18, 1987

The Honorable Quentin N. Burdick, and
The Honorable Robert T. Stafford
Committee on Environment and Public Works
United States Senate
Washington, D.C. 20510-6175

Subject: Replies to Questions Raised During Testimony Before the Subcommittee on Water Resources, Transportation, and Infrastructure.

Dear Senators Burdick and Stafford:

I received your letter of October 30, which referred to five questions that arose out of testimony I gave to the Subcommittee on Water Resources, Transportation and Infrastructure, but which time did not permit an extended discussion. I have, in the attached, attempted to respond to these questions based on the work of the Committee on Infrastructure Innovation of the National Research Council which prepared the report presented at the hearing, **Infrastructure for the Twenty-First Century: Framework for a Research Agenda.** Some of the issues you have raised were not specifically addressed by the Committee, and it is therefore difficult for me to discuss these at length on behalf of the Committee.

I appreciate the opportunity to discuss this very important subject involving the future of the nation's infrastructure, and value your interest and concern.

Sincerely,

L D Dahms

Lawrence D. Dahms
Chairman, Committee on
Infrastructure Innovation

The National Research Council is the principal operating agency of the National Academy of Sciences and the National Academy of Engineering to serve government and other organizations

Questions Raised by Senator Robert T. Stafford

Responses By: Lawrence D. Dahms for the
Committee on Infrastructure Innovation
of the National Research Council

1. If there is a Federal government role in funding additional research and development, where should the money come from?

The Committee on Infrastructure Innovation discussed the various options for financing a long-term program of infrastructure research to try to gain a perspective on the magnitude of the problem. They did not, however, attempt to make a specific recommendation regarding the optimal approach to financing such a project, recognizing that this subject deserved a more cautious approach and a considerable amount of research to delineate the costs and benefits of the various options. This, in fact, was one of the reasons that led the Committee to recommend a two-year implementation program as the next step towards achieving a research and development program for infrastructure facilities.

2. Is the liability potential in research and development efforts a concern? If so, how do you believe it should be addressed?

Liability was recognized by the committee as a barrier to innovation from two perspectives--financial liability and professional liability. Financial liability is acknowledged in the discussion surrounding the issue of large scale projects. The committee noted the following:

> Most public works projects are costly, large-scale, complex, and geographically dispersed. Life expectancies for these facilities are typically 50 to 100 years, and construction of these facilities is of long duration. These systems are expected to provide continuous and and reliable products or services. To introduce innovations into this class of engineering systems requires large-scale, complex, probably costly, and long-term research and development efforts. These features make it difficult to mount support for infrastructure innovations, and to sustain support once mounted in jurisdicitons with limited resources and short-term political agendas. The problem is particularly acute for small jurisdictions attempting a prototype or demonstration project. There are many costs associated with these projects, particularly if they are less than successful.

Professional liability was also perceived as a barrier to innovation in the infrastructure arena. The committee found that "the number of liability suits and the size of damage awards has increased dramatically in the past few years. Many professionals are being pressured to follow ultra-conservative practice in the design and construction of infrastructure facilities."

How best to address this problem should be a subject of research, itself. A careful look at insurance and bonding requirements, at traditional contracting practices, and at dispute resolution procedures (mediation, arbitration, and litigation) is needed to address the issues involved with professional liability. Similarly, special research on the benefits of cosponsored demonstration projects or matching contributions for research would provide insights into new ways of reducing the financial liability facing small jurisdictions and aid in transferring technology to large complex public works projects. The committee perceives the initiation of such research--a combination of social, legal and technical sciences--as a goal of a long-term research and development program for infrastructure facilities.

3. What effect do innovative technologies have on the labor market and job displacement? Is there any evidence that concern about job displacement is a barrier to the immediate and widespread implementation of innovative technologies?

In addition to the other barriers to innovation described in the report, the committee noted the misuse of professional standards and government regulations. One example cited by the report involved the reluctance of the plumbing unions to adopt polyvinyl chloride (PVC) pipe as an innovation. "Unions objected to the use of PVC because it was a labor-saving improvement which reduced the skill and time required for the plumbing trades. Municipalities, reacting to union pressure and lack of knowledge regarding this new material, were also reluctant to change the building codes."

Such examples illustrate that new technologies are likely to change the labor requirements and concerns about job displacement can become significant barriers to the adoption of innovation. The committee hopes that such barriers can be overcome with a well-founded data base that demonstrates the cost and benefits of new innovations, that points to new efficiencies, and that brings the issues into perspective so that decisions are based in fact rather than unfounded fear. The development of this data base would be one of the products of a national research agenda for public works infrastructure.

Another panel of the National Research Council recently completed a study on the topic of technology and employment. This panel concluded the following:

Technological change is an essential component of a dynamic, expanding economy. Recent and prospective levels of technological change will not produce significant increases in total unemployment, although individuals will face painful and costly adjustments. The modern U.S. economy, in which international trade plays an increasingly important role, must generate and adopt advanced technologies rapidly in both the manufacturing and nonmanufacturing sectors if growth in U.S. employment and wages is to be maintained. Rather than producing mass unemployment, technological change will make its maximum contribution to higher living standards, wages and employment levels if appropriate public and private policies are adopted to support the adjustment to new technologies.

The foregoing conclusion is discussed in considerable detail in the report prepared by the panel entitled **Technology and Employment**[1]. It provides intersting reading and it will be useful if you are interested in further data on this subject.

4. For a long time it has been a problem to convince elected officials to use new technologies and materials that have a lower life cycle cost but a higher initial cost. Is there anything that can be done to encourage these officials to use such technologies and materials?

This subject was not a specific item of deliberation by the committee. The committee did recognize, however, that traditional contracting practices have become a barrier to innovation in a variety of ways. Any research program should include as an agenda item the subject of contracting practices. A careful analysis of the advantages and disadvantages of design-build, design-build-finance, or design-build-operate contracts should be conducted so that newly elected officials will have a solid basis for moving beyond traditional practice and perhaps introduce life cycle cost approaches to contracting and purchasing.

5. What specific changes do you believe should be made to patent law to encourage more R&D and technology transfer?

Patent law was not a subject addressed by the committee during the course of its work, nor is it related to my experience and I am therefore reluctant to comment here. This is a subject, however, that should logically be included in any research and development agenda for infrastructure--a subject that would complement the unique scientific and technical agenda that is required for infrastrucuture systems.

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[1] Cyert, Richard M. and David C. Mowery (eds), 1987, **Technology and Employment**, Washington, D.C.: National Academy Press.

STATEMENT OF MS. JENIFER ROBISON

Senior Analyst
Office of Technology Assessment
U.S. Congress

Testimony Before
Subcommittee on Water Resources,
Transportation and Infrastructure
Committee on Environment and Public Works
United States Senate

CONSTRUCTION AND MATERIALS RESEARCH AND DEVELOPMENT FOR THE NATION'S PUBLIC WORKS

October 21, 1987

Testimony

The nation's infrastructure is the physical framework that supports and sustains virtually all domestic economic activity; it is essential to maintaining international competitiveness as well. In its broadest definition, "infrastructure" includes all types of public facilities, such as highways, roads, and bridges; water resource projects and water supply and treatment systems; sewer systems and wastewater treatment plants; locks, dams, and waterways; ports; airports; railroads and mass transit facilities; public buildings; and resource recovery facilities. At the request of this Subcommittee, the Office of Technology Assessment (OTA) recently completed a study of innovation in the technologies and materials that can be used for construction and maintenance of transportation and water-related infrastructure components — those commonly termed "public works."

In that study, OTA found that the long-term cost savings from the development of new and improved technologies and materials for public works construction, repair, and rehabilitation, or of a better understanding of the properties and uses of currently available technologies and materials, could far exceed the short-term costs of R&D. Despite the potential savings, OTA found that public and private expenditures for R&D related to infrastructure technologies and materials are very low--generally less than 0.4 percent of gross annual expenditures by Federal agencies or 0.3 percent of business volume for industries.

The low level of Federal support may be attributed to budget priorities in the face of massive deficits and to the Administration's policy that R&D should be the responsibility of private industry. At the same time, however, OTA found that government procurement processes and the nature of public works investments create substantial disincentives for nonfederal R&D. This is in marked contrast with Japan and many European countries, where both direct and indirect government support for R&D on construction materials and technologies are available.

While OTA was unable to quantify the costs of specific new R&D activities or their possible benefits, we can offer several examples of research areas with potentially big "payoffs":

- If research could improve the performance and durability of roads and bridges by just one percent, the direct savings in the total cost of their rehabilitation and replacement would be $10 billion to $30 billion.
- Development of anti-corrosion protection systems that could extend the performance life of bridge decks to 20 years (only half the theoretical design life) would have a payoff in excess of $2 billion in total repair costs.
- Even a one percent improvement in the performance life of asphalt pavement could save over $100 million annually in total highway repair and construction costs.
- Use of improved asphalt cements in initial construction or overlay could save repair and repaving costs of more than four times the cost of the cement.
- Arresting either external or internal corrosion in sewer and water pipe systems could almost double their performance life.

As these examples show, the benefits of even modest increases in materials R&D for highways alone could be $15 billion to $35 billion over the next 10 to 20 years. Compare these savings to the current annual Federal and nonfederal investment in materials R&D for all types of public works of $53 million to $62 million, and the value of the investment in R&D becomes even more pronounced. Still more significant, much of this benefit could be obtained with materials that are available now, but are not used because of inadequate technology transfer, the perceived financial risks of using new materials, and government procurement practices. Of particular importance is research into methods of improving the life of drinking water systems, which has a relatively low level of support. A focused research program to increase knowledge about the factors affecting the life-cycle costs of clean water systems could bring rich benefits as the country embarks on a renewed effort to upgrade such systems.

OTA also found there are substantial institutional barriers and economic disincentives to nonfederal R&D, especially in the movement of new technologies and materials off the research bench and into the field. These include procurement processes and risks that impede the adoption of new technologies and materials in public works projects, and splintered private and governmental roles. Moreover, investments in public works are characterized by high fixed costs, lengthy planning and construction schedules, complicated public financing arrangements, and long payback periods, which lead to uncertain economic returns on R&D investment. OTA concluded that simply increasing R&D expenditures without also taking steps to alleviate these barriers and disincentives will do little to advance the materials, machinery, and methods by which we design, build, and maintain our Nation's public works.

BACKGROUND

Federal, State, and local governments spend large sums on public works annually — $97.3 billion in 1984 — accounting for about 24 percent of all new construction annually. However, the growth rate of public works investment has slowed significantly over the past three decades compared with the growth rate of net private capital formation.

Moreover, the public sector has shifted its primary focus from building new stock to maintaining its existing capital base. Construction of entirely new, large-scale public works projects has slowed substantially with the completion of the interstate highway system and the shift in national budget priorities toward defense-related projects.

Still another trend is the shift in spending by level of government. From 1960-1984, the relative role of States in funding public works declined, while the local share of infrastructure spending rose, with the greatest increase occurring since 1980. In 1984, local governments accounted for 50 percent of the total public works investments, the Federal Government 27 percent, and State governments 23 percent.

WHO IS FUNDING R&D FOR PUBLIC WORKS?

Research and development for public works are sponsored and carried out by a number of Federal agencies, and by State and local governments, universities and research centers, trade associations, and corporations. However, domestic public works projects tend to borrow technologies and materials developed for other applications. Federal research agendas reflect this and emphasize adapting available products for specific public works applications; R&D expenditures on new technologies and materials are relatively small. Total Federal R&D for infrastructure was $103 million in FY85, or roughly 0.3 percent of total new infrastructure construction (see Table 1). Of this amount, OTA estimates that Federal agencies spent around $36 million on R&D for infrastructure materials; $14 million on incremental and advanced improvements in construction technologies and methods; and the remainder on design, evaluations, needs analyses, management systems, feasibility studies, information dissemination, etc.

Among Federal agencies, the Army Corps of Engineers has by far the largest infrastrcuture R&D budget, accounting for 54 percent of the total Federal expenditures; followed by the Federal Highway Administration with 23 percent (excluding contributions to State Highway Planning and Research projects). The National Bureau of Standards and the Environmental Protection Agency each account for around 6 percent of the total, while the Bureau of Reclamation and the National Science Foundation each account for about 4 percent.

Although reliable data on nonfederal R&D funding are difficult to obtain, OTA found that private sector R&D also is minimal. OTA estimates R&D expenditures by construction equipment and materials manufacturers to be less than 0.3 percent of the total annual value of new construction in the United States.

The low levels of private R&D funding for infrastructure contrast markedly with industries that sell defined products in commercial markets. For example, the chemical and electrical industries each spend about 4.3 percent of revenues for R&D, while the motor vehicle industry spends about 3.2 percent. Table 2 shows other comparisons.

HOW DOES DOMESTIC PUBLIC WORKS R&D COMPARE TO RESEARCH EFFORTS ABROAD?

Comparing infrastructure R&D expenditures in the United States to those abroad is difficult because the funding processes and programs are so different. Government research support in dollars is not markedly lower in the U.S. than abroad, but foreign governments play a much more active role in facilitating R&D and in bringing technical innovations into common practice.

Strong incentives are available in other countries to work the "bugs" out of theory and move new ideas to the marketplace. In both Japan and Europe, for example, the governments encourage innovation and development through tax incentives or matching funds, and through flexible bidding concepts. West Germany makes public grants available for the introduction of promising innovations into commercial markets, and special "linker" organizations facilitate innovation by expediting the flow of technical information and contributing to the stimulation of new ideas. The Japanese government also has agencies that coordinate research and disseminate information.

6

WHAT ARE THE CONSTRAINTS ON EFFECTIVE R&D FOR PUBLIC WORKS IN THE U.S.?

OTA found numerous institutional and economic factors that mitigate against increased R&D spending, make the available research dollars less cost-effective, and inhibit the adoption of advanced construction technologies and materials in public works projects. Over the long-term, this will mean increased construction, repair, and maintenance costs for public works agencies.

First, no national goals for public works infrastructure have been set, making it difficult to determine an optimum amount for Federal R&D expenditures. Moreover, to make best use of the limited available funding, national needs must be determined and the research agenda focused on those needs. Innovation centers are one excellent means of targeting research because they represent a specific allocation of resources over a period of time for research, they require the research group to focus on particular kinds of technologies and materials, and they target areas of R&D already identified as being likely to produce particular cost savings and technology improvements.

Second, a variety of factors combine to reduce private sector R&D. Keen competition for public works contracts forces firms to cut costs wherever possible to tide them over the irregularities of public spending. This economic climate does not support the large front end costs of developing and implementing innovations in construction technology and materials. Also important is the fact that public works construction materials generate a low rate of return and have a long payback period compared to other investments.

Third, government contracting and procurement policies often act as a disincentive to infrastructure R&D or the implementation of innovative technologies and materials. For example, government agencies typically prescribe key project specifications such as the type and amount of asphalt. Further, the contracting process is keyed to low bids, and new techniques and materials usually have a higher initial cost than conventional ones. Minimum life-cycle costing methods are essentially absent in this field. Governments and corporations also perceive a high level of risk in using new infrastructure materials and construction methods in the event that they do not perform as well as expected.

Finally, because of the number of agencies and organizations that conduct R&D, and the problem-oriented nature of much of the research, information flow among researchers is limited. A related problem is the slow rate at which new or advanced materials and technology are accepted by government agencies, architects/engineers, and contractors for incorporation into public works projects.

Gaps in the R&D agenda result from the limited funding of R&D, inadequate information and technology transfer, and procurement practices and perceptions of risk. These take the form of mismatches between R&D projects and public works needs, and of inadequate research on particular materials and technologies and their value in individual projects, and on evaluating tradeoffs between construction, maintenance, repair, and replacement.

Hindrances to basic research for infrastructure R&D are the most substantial. There is almost no research on, or expectation of profit from, developing totally new methods of delivering transportation, water supply, and wastewater disposal services. Even basic research on new materials, such as a totally new material for building roads, is minimal. Moreover, few agencies or organizations are researching the public works applications of advanced technologies and materials (e.g., ceramics and composites) that were not developed specifically for infrastructure.

Among the numerous issues related to public works that need further exploration are:

— An in-depth look at the relative costs and benefits of design versus performance standards in public works procurement,

- Development of improved life-cycle costing methods for use in public works procurement,
- Analysis of the tradeoffs among expenditures for maintenance versus repair versus new construction or replacement and how those trade-offs might be affected by the capital and maintenance costs of new technologies and materials,
- Analysis of means for facilitating the international exchange of information about construction technologies and materials R&D for all types of public works projects, and
- Analysis of the return on investment for private sector R&D on infrastructure construction technologies and materials.

In summary, OTA found that R&D on technologies and materials used for public works could bring substantial long-term savings in the construction and maintenance of roads, bridges, and water and wastewater systems. However, such R&D receives a very low budget priority at all levels of government and in the private sector. The primary current need is for focused centers of research (especially on water systems), and for incentives to move the research results into practice.

TABLE 1

FEDERAL R&D EXPENDITURES COMPARED TO NEW INFRASTRUCTURE CONSTRUCTION

(millions of dollars)

Year	Value of New Infrastructure Construction	Federal R&D	Percent of Total Expenditures
1985	$34,370	$103	0.3%
1986	$38,742	$109	0.3%
1987	NA	$97	NA

SOURCES: Total value of new construction adapted by OTA from U.S. Department of Commerce, Bureau of the Census, Value of New Construction Put In Place, C30-86-12, February 1987; Federal R&D expenditures from data provided by Federal agencies.

TABLE 2

PRIVATE SECTOR R&D EXPENDITURES

COMPARED TO GROSS SALES

(1984)

Industry	R&D as percent of sales
Aircraft and missiles	4.2
Electrical equipment	4.3
Machinery	5.2
Chemicals and allied products	4.3
Motor vehicles	3.2
Metals and mining	1.5a
Electric utilites (investor-owned)	0.42b
Construction	<0.33c

SOURCE (except where noted otherwise): National Science Foundation, National Patters of Science and Technology Research, NSF 86-309, p. 56.

[a] Estimate for 1985 from "R&D Scoreboard," Business Week, June 23, 1986, pp. 139-156.

[b] Sherman Feher, Electric Power Research Institute, personal communication, April 1987.

[c] OTA estimates for construction expenditures in 1985. According to the National Science Foundation, they receive too few responses to their annual survey from construction firms to provide reliable expenditure figures.

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Congress of the United States
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JOHN H. GIBBONS
DIRECTOR

December 1, 1987

The Honorable Robert T. Stafford
Ranking Minority Member
Committee on Environment and Public Works
United States Senate
Washington, DC 20510-6175

Dear Senator Stafford:

Thank you for the opportunity to testify before your committee on issues related to research and development for public works. Enclosed please find the responses to the questions that you submitted to me in writing subsequent to the hearing.

If you need additional information, I invite you to call me at 228-6279.

Sincerely,

Jenifer Robison

Jenifer Robison
Project Director

Enclosure

OTA RESPONSES TO QUESTIONS FROM SENATOR STAFFORD

1. If there is a Federal government role in funding additional research and development, where should the money come from?

The Federal government already plays a significant role in funding R&D for public works. OTA's Staff Paper, *Construction and Materials Research and Development for the Nations' Public Works*, published in June 1987, estimates that Federal R&D funding for construction technologies and materials related to public works totalled approximately $97 million in FY 1987. OTA recognizes the budget constraints on increasing R&D funding in this era of massive deficits. The most realistic sources of additional funding probably would be dedicated user fees and other forms of taxes.

In its 1987 Staff Paper, however, OTA found that the available Federal R&D funding is not used as effectively as it might be. OTA believes that increasing the effectiveness of current R&D and broadening the application of its results would stretch the available Federal dollars, and could alleviate disincentives to increased private sector funding for R&D on infrastructure construction and materials.

In order to increase the effectiveness of current R&D, several steps must be taken. First, national goals must be set for infrastructure R&D, and the research agenda targeted more directly to national needs. Second, the R&D needs to be coordinated in order to avoid duplicative projects and to eliminate gaps in the research agenda. Currently, R&D efforts are highly fragmented, spread among at least seven Federal agencies, State and local governments, private industry and user associations and the numerous contractors for all of these. Coordination among these groups would be based on increased information flow among researchers through mechanisms such as a clearinghouse on ongoing projects. Innovation centers (e.g., the NSF-funded Engineering Research Centers, the Army-funded Centers of Excellence) also are an excellent means of targeting and coordinating research.

Third, a number of institutional factors combine to limit the application of R&D results in public works projects, and thus serve as disincentives to private sector R&D. These include government procurement policies that prescribe key project materials and construction techniques; liability concerns about the use of innovative products and techniques; and low-cost bidding and a highly competitive environment for public works contractors, which do not support the relatively large front-end costs of developing and implementing innovations in construction and materials.

2. Is the liability potential in research and development efforts a concern? If so, how do you believe it should be addressed?

The liability potential is not a concern so much in the R&D itself, as it is a concern in the implementation of research results. Public works agencies and utilities place a very high premium on the reliability and safety of public works. If innovative construction techniques or materials turn out to be less effective in the field than in the laboratory, the economic and political costs of repair and replacement can be large. Therefore, these agencies and their contractors are reluctant to experiment with innovations. It is far easier to obtain a rate increase or other funding to preserve the immediate reliability of a system than to use higher-cost innovative materials or techniques that might prolong reliability at some time in the future.

Within the scope of our 1987 Staff Paper, OTA was unable to determine the extent to which liability concerns actually are a disincentive to innovation, and therefore to R&D, in construction technologies and materials for public works. We believe that this topic deserves further study. If it is found to be a major concern, possible means of addressing it might include co-funding for demonstration projects, the use of Federal facilities for demonstrations, and some form of "repair insurance" such as that used in the Environmental Protection Agency's Innovative/Alternative Technology Program for wastewater treatment projects.

3. What effect do innovative technologies have on the labor market and job displacement? Is there any evidence that concern about job displacement is a barrier to the immediate and widespread implementation of innovative technologies?

This subject was not addressed in OTA's 1987 Staff Paper on construction technologies and materials R&D for public works. In 1986, OTA's Industry, Technology, and Employment Program published a report on *Technology and Structural Unemployment: Reemploying Displaced Adults*. Although this report did not specifically focus on public works, it does give special attention to the role of technology as a cause of displacement. The summary for this report is enclosed. Copies of the full report may be obtained from the OTA Publications Office, at 224-8996.

4. For a long time it has been a problem to convince elected officials to use new technologies and materials which have a lower life cycle cost but a higher initial cost. Is there anything that can be done to encourage these officials to use such technologies and materials?

State and local (and typically Federal) public works contracting procedures act as a disincentive to using innovative materials and technologies in several ways. All of these disincentives must be addressed, including the higher initial costs. First, the potential long-term cost and other benefits of innovative materials and technologies must be demonstrated thoroughly. Local officials are unlikely to make investment decisions based on limited laboratory studies. Demonstration projects under a variety of field conditions are needed to document potential long-term cost benefits. Moreover, as mentioned above, because of liability concerns these demonstrations must include some form of "insurance" for the sponsoring government that assumes the initial risk.

Second, even for conventional materials and technologies, virtually no quantitative analyses are available to document the long-term cost trade-offs between initial cost and subsequent maintenance, repair, and replacement. Thus local officials have little beyond immediate budget considerations on which to base investment decisions in public works.

Third, low-cost bidding and design specifications seem to go hand-in-hand. Researchers need to take another look at the potential role of performance specifications that would emphasize the long-term benefits of innovative materials in public works contracting.

Finally, those public works for which user fees are charged directly (primarily water and sewerage) usually are assessed on straight use basis, with little or no allowance for long-term maintenance and repair. As noted above, under such rate structures, increases are difficult to obtain for potential long-term service benefits that may not yet be proven in the field.

5. What specific changes do you believe should be made to patent law to encourage more R&D and technology transfer?

Within the scope of our 1987 Staff Paper, OTA was unable to undertake a comprehensive analysis of patent law and policy. The limited work we were able to do suggests that the recent changes in U.S. patent law may have addressed many of the disincentives to R&D and technology transfer in construction technologies and materials for public works. However, too little time has passed to make a definitive judgement. In the meantime, the U.S. could learn from foreign models, in which government agencies both scan the world marketplace for new technologies and materials and disseminate the resulting information to domestic companies.

Other problems arise because materials are viewed as commodities, which implies that any proprietary products resulting from R&D efforts will not have much market penetration (even if they are patented).

Testimony of Dr. Richard L. Tucker

to

The United States Senate

Committee on Environment and Public Works

Subcommittee on Water Resources, Transportation, and Infrastructure

Washington, D. C.

October 21, 1987

Mr. Chairman, members of the committee, distinguished guests, ladies and gentlemen, good morning. My name is Dr. Richard L. Tucker. I am a tenured professor of Civil Engineering at The University of Texas at Austin, where I teach graduate level courses in project management. I also am Director of the Construction Industry Institute, or CII as it is known, which is a research group under the University's Bureau of Engineering Research. CII is an organization currently composed of 66 companies which has as its purpose to improve the cost effectiveness of the U. S. construction industry through increased research and development.

In my several capacities, both with the University and with the member company representatives of CII, I have enjoyed a unique opportunity to gain insight into the

American construction industry -- its strengths and its weaknesses. I have come to know and to respect the leaders of that industry. Through interaction with them and through visiting their international competitors, I have reached a strongly felt conclusion.

I submit to you that the U. S. construction industry is falling behind in the crucial field of research and development. It is falling behind not only when compared to the efforts of other industries, but to other countries as well.

The basic problem in the lack of construction R&D is simply one of almost no effort. Regardless of the excuses, virtually no organized R&D activity has been devoted to improving the construction erection process. The simple fact is that other industries invest a great deal more of their resources into R&D. Indeed, construction research is funded at a level much less than 1 percent of gross sales, whereas other industries' funding levels are in the range of 3 percent or more.

Where does construction fit as a level of funded effort? Despite the establishment of CII and the National Science Foundation's recent commitment to construction research funding, it is doubtful that we could identify as much as $10 million in research efforts dedicated to the construction erection process. In comparison to other industries, such efforts appear to be severely limited in size. Therefore, with limited resources it is necessary to maximize effectiveness in order to develop better information and techniques.

The construction industry is unique. It is fragmented. A construction project involves many parties, although none has dominant control over its success. The industry has a transient nature, both in the projects and the personnel assigned to a given project. The system, whereby particular activities such as design and construction are separated among the participants, hampers the development of a coordinated research effort. Project activities also have a non-repetitive feature, so that benefits from the learning curve are diminished. Moreover, there is an abysmal lack of data in published literature and even in many company files. Construction cannot be easily modeled in a laboratory. Appropriate information is needed from the projects themselves. Above all, communication is difficult. It is rare that innovations and successes from a project are shared with others in the industry or even among members of the same company. Thus, even with creative and capable people in the industry, there is a dearth of information available to build a research base or to develop advancements from past experiences. These characteristics, although perhaps overstated for a specific situation, are representative of the industry as a whole.

The Business Roundtable, a collection of chief executive officers of some of the largest corporations in the United States, began in 1977 a five-year study of the industry. The study, known as the Construction Industry Cost Effectiveness or CICE Project, generated over 200 recommendations for construction owners and contractors that could be implemented and possibly save the industry more than $10 billion annually. One of the recommendations was the establishment of a national center for construction research. To that end, the Construction Industry Institute was established, and in its four years of existence has become a national forum for construction owners, contractors, and academia. There is no other comparable organization which brings together these parties with a common purpose of advancing the industry through research. At present, over 65 of the nation's largest owners and contractors have committed funds and personnel to CII activities. Over 25 of America's leading universities are involved. A total of about 350 company and university personnel participate. The CII efforts, however, are still small in comparison to those of other countries.

This year several CII member companies sent people to Japan. On two separate occasions, I accompanied representatives of U. S. businesses in visits to Japanese companies. We were thus able to gather a great deal of information from various sources: interviews with Japanese company executives, CII member company experiences, literature surveys, and actual visits.

We visited the top five, or Big Five, Japanese construction companies. Six companies actually could be considered, but only five with respect to domestic construction work within Japan. Each of the Big Five has roughly 10,000 to 15,000 employees and an annual sales volume between $6 billion and $7 billion. Precisely 1 percent of their gross sales, or about $60 million, goes into each company's R&D budget. No one company has less than 300 people on its R&D staff, and all have campus-like research centers. As a comparison, we have calculated that of the approximate 300 participants in CII activities, their total donated work-hours for CII R&D is 75,000 hours annually. Each of the Big Five Japanese companies have similar size R&D staffs, yet each staff represents 600,000 work-hours or more.

Shimizu, one of the Big Five, had a 1986 sales volume of about $6 billion; their net income after taxes was about $65 million or about 1 percent; their R&D budget also is about $60 million. They have 14,000 employees; 630 of them are in R&D. They have two major research institutes in addition to a technology development division that has a similar number of people. Shimizu is typical of the other Big Five companies. Although we visited five of the largest construction companies in Japan, we understand that their 20 largest companies all have separate and formally organized research centers.

The Japanese take a very long-range approach to their business dealings. This approach is much more one of increasing market share rather than one of making short-term profits. They are putting a great deal of emphasis on improving their management techniques at this time. They also are attempting to diversify both in terms of geography and product lines. The U. S. construction industry historically has represented 8 to 10 percent of our gross national product. Japanese construction volume has represented about 20 percent of their GNP. In recent years, however, the Japanese construction share of their GNP has fallen to about 14 percent, thus they now have an overcapacity in construction capability. They are testing the foreign market, and I believe that this is a significant indicator of their future intentions. The Big Five have only about 5 percent of their business overseas, so 95 percent of their business is domestic. In further support of my belief that change is coming, the Japanese Ministry of Construction has devised a long-range plan to help Japanese companies penetrate foreign markets.

With regard to R&D activities in the Japanese construction industry, here again they take the long-term view and a deliberate approach. A tremendous amount of work is being directed toward intelligent buildings and building environmental control systems. All of the companies have a great deal of research being conducted on clean room technology.

Recently, a U. S. owner contracted with a Japanese construction firm because of its clean room technology. In addition, the Japanese do a great deal of research on earthquake resistant systems, wind analysis, computer-aided design, and construction systems for structures and foundations. Most of the Japanese companies also undertake some research regarding factory automation and robotics. As much as 10 percent of their R&D effort is concerned with automation and robotics. Many of their robots are at work on actual construction sites. I can tell you unequivocally that the Japanese are ahead of the rest of the world in terms of construction automation and robotics.

Their primary motivation for robotics research is safety. They have 1,500 worker deaths per year in construction, yet have no government administration in safety, such as our Occupational Safety and Health Administration. Their secondary motivation comes from the fact that demographic studies have shown that the Japanese will have a declining workforce. Therefore, instead of emphasizing training programs, they want to develop machines that can take the place of workers. U. S. Department of Labor projections show that we also will face a decline in workforce size in the 1990s, which suggests that a similar emphasis on R&D could be important in closing the gap.

The types of robots that the Japanese have are varied, but basically fall into such categories as those robots that move materials, those that configure materials, those that position, some that make connections, some that coat materials, and also some that are involved in inspection.

They also have strong computer-aided design and drafting, or CADD, capabilities. For example, at an early stage in a project a client can specify a certain sized building to be constructed on a certain plot of land. Within three days, an amazingly short period of time for such an effort, a Japanese company can produce for that client a three-dimensional picture of what this building will look like and at a guaranteed final construction price. Only a few U. S. companies are similarly advanced in their application of CADD technology, and where it exists, such capabilities are proprietary and thus not widely available.

If we look at key characteristics of the Japanese construction industry, I think that we can come to some strong conclusions. Most important of these perhaps is that the Japanese are coming. They are going to be strong competitors regardless of how you may wish to view it. At the present time, I believe that we have an edge on them in management, but there is stong evidence that they have an edge on us in technology. Their management is improving.

As a faculty member, I can tell you that most of our construction programs at U. S. universities have Japanese students studying for advanced degrees. The Japanese companies are spending about $35,000 per year per student to have them learn project management, American style.

The Japanese also are getting involved in joint ventures with our companies. We are not likely to stay ahead of them in management techniques for long. Some of my colleagues believe the management gap has already closed. Japanese technology is gaining momentum.

I was tending to be rather critical of what they are doing in robotics because I didn't think they were working the high pay-off areas. After I was in Japan, however, I realized that they were not telling me all that they knew. They are undoubtedly working on many advanced technology applications.

The Construction Industry Institute is a national forum for the U. S. construction industry. CII represents the leaders of our industry. We have pooled the top resources of owners, contractors, and academia to fund construction R&D. Sadly, collectively we are at least an order of magnitude behind any one of the Big Five Japanese companies, and we are lagging behind what we know must be done. We have an organization in place to increase the R&D level of effort. Such an increase is critical if we are to improve the U. S. construction industry's competitive position in the world marketplace. As the largest industry in the nation, we represent over $350 billion per year in business, yet less than 0.1 percent of that can be identified as going to R&D. Other industries and even other countries are putting a much higher portion of their gross sales volume into R&D. I think that a commitment is needed that will enable us not only to survive and compete on a global scale, but to regain worldwide leadership in construction technology. We are already behind in such an effort, and as an American, that offends me.

It is not likely that private industry alone can fund an adequate R&D effort either to meet the foreign competition or to address the productivity needs of the U. S. construction industry. Government support is needed. I believe that the American industry has already recognized the needs and has made its commitment to participate in the necessary effort.

With a rather modest amount of government support, significant accomplishments should be attainable.

Mr. Chairman, I appreciate the opportunity afforded me to present my views to the Committee. The construction industry has a problem; it is of such scope and importance that I believe it is a national problem. The structure exists to begin to solve this problem, but in a fiercely competitive industry that has suffered through several lean years, the key to progress is resources -- resources that will not be forthcoming without outside support. Your understanding of this situation and action in response is terribly, terribly important.

This concludes my presentation, Mr. Chairman. I would welcome questions from any of the Committee members. Thank you.

COLLEGE OF ENGINEERING
THE UNIVERSITY OF TEXAS AT AUSTIN

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22 December 1987

The Honorable Quentin Burdick, Chairman
The Honorable Robert Stafford, Ranking Minority Member
Committee on Environment and Public Works
United States Senate
Washington, D.C. 20510-6175

Dear Senators Stafford and Burdick:

I have been travelling continuously since receiving your letter of October 30, 1987. Please excuse my tardiness in responding.

For simplicity, I have typed responses to your questions on the sheets attached to the questions. If you have further questions, I will be pleased to meet with you.

Cordially Yours,

Richard Tucker

Richard L. Tucker cw

RLT:cw

attachments

QUESTIONS FOR DR. TUCKER FROM SEN. BURDICK

1. What do you think is the single most effective and feasible action Congress could take to strengthen the infrastructure of our nation?

2. What research is the Construction Industry Institute doing in the area of construction worker productivity?

3. In the October 24, 1987 issue of the National Journal, Neal R. Peirce discusses the problem of corruption in public works contracting and construction. How serious do you believe the problem to be and what remedies would you suggest?

R.L. TUCKER RESPONSES TO QUESTIONS FROM SENATOR BURDICK

1. The single most effective and feasible action for Congress to take would be to create a dedicated R&D fund for construction methods research. Our overall research effort is, quite simply, an order of magnitude less than that in other countries.

2. The CII has many programs in the area of worker productivity. We have 15 task forces, involving over 300 persons from industry and academia, all dedicated to this effort.

3. I do not believe that the corruption issue is widespread. The participants in the industry are primarily honest, hard-working and dedicated individuals. It is unfortunate that the occasional "bad apples" are so visible. However, it is an industry that requires many split-second decisions and many communications breakdowns occur.

QUESTIONS FROM SENATOR ROBERT T. STAFFORD

1. If there is a Federal government role in funding additional research and development, where should the money come from?

2. Is the liability potential in research and development efforts a concern? If so, how do you believe it should be addressed?

3. What effect do innovative technologies have on the labor market and job displacement? Is there any evidence that concern about job displacement is a barrier to the immediate and widespread implementation of innovative technologies?

4. For a long time it has been a problem to convince elected officials to use new technologies and materials which have a lower life cycle cost but a higher initial cost. Is there anything that can be done to encourage these officials to use such technologies and materials?

5. What specific changes do you believe should be made to patent law to encourage more R & D and technology transfer.

R.L. TUCKER RESPONSES TO QUESTIONS FROM SENATOR STAFFORD

1. There is an obvious Federal role in funding additional R&D. First, the industry is too fragmented to provide its own funding. In that way it is similar to medicine and agriculture in that construction affects everyone. Second, the Federal government is the nation's largest owner and purchaser of construction services, and thus has the most to gain from R&D that will reduce costs and improve projects. The most logical funding way is to include an R&D "set-aside" on all projects procured by Federal agencies, similar to that for the arts on GSA projects.

2. I do not believe the liability potential to be significant, other than the potential risk in doing things differently. In order to make progress, we must try new things. Thus, there is always a slight risk associated with progress. However, the Construction industry is very conservative and has many "checks and balances" that make any risks manageable.

3. Job displacement is not a major concern. Indeed, all demographic projections point to a decline in the construction work force and to a shortage of skilled labor. Thus a major motivator for technological innovation is that of finding machines to offset some of the projected labor shortages. There will, however, be a necessary retraining task associated with any new hardware developments.

4. The life cycle costing issue is receiving a great deal of attention at this time. The dependable ability to make such analyses is available now. I'm afraid that the only answer to your question concerning acceptance by public officials must be found in better education in such matters.

5. I do not believe that patent laws are a significant problem at this time. There is much attention and momentum building for technology transfer. The principal problem is one of communications and establishing persuasive motivators for designers and contractors to use improved methods.

STATEMENT OF

MR. ALBERT A. GRANT
PRESIDENT-ELECT

AMERICAN SOCIETY OF CIVIL ENGINEERS

INNOVATION AND THE UNITED STATES PUBLIC WORKS INFRASTRUCTURE

SUBMITTED TO THE
WATER RESOURCES, TRANSPORTATION, AND INFRASTRUCTURE SUBCOMMITTEE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

UNITED STATES SENATE

Washington, D.C.
October 21, 1987

Good morning Mr. Chairman and members of the Committee, I am delighted to be with you today. My name is Albert A. Grant, and I am currently President-elect of the American Society of Civil Engineers (ASCE), the nation's oldest engineering organization. I will be installed as President of ASCE five days from now. On behalf of the 100,000 members of ASCE, thank you for this opportunity to testify on the important subject of infrastructure research, development and innovation.

My top priority in the year ahead is for ASCE to take a leadership role in ensuring the quality and value of current and future infrastructure investments through increased innovation, research and productivity in the design, construction and management of major public works projects. The nation's public works infrastructure includes highways; streets; buildings; mass transportation facilities and equipment; resource recovery facilities; airports; airway facilities; water supply and distribution systems; wastewater collection, treatment and related facilities; dams; federally owned buildings; docks and ports; waterways; and other public facilities...cutting across almost every facet of civil engineering practice. Moreover, because of ASCE's technical and professional expertise, and diverse membership base - with individual members working in private practice, academia and research, and all levels of government - I believe the Society is in a unique position to address the nation's growing infrastructure needs.

In this era of fiscal restraint, when infrastructure investment as a percent of Gross National Product (GNP) has declined significantly, and visible signs of infrastructure deterioration are everywhere, it is incumbent upon us to explore ways of deriving more quality and value from every infrastructure dollar invested. Given current and near-term Federal budget realities, and the vital linkage between a sound infrastructure and U.S. economic health and competitiveness, it is imperative that our country undertakes a concerted and systematic infrastructure research and development program.

CONSTRUCTION PRODUCTIVITY

In 1986, the Committee on Construction Productivity of the National Research Council's Building Research Board released a report entitled "Construction Productivity: Proposed Actions by the Federal Government to Promote Increased Efficiency in Construction." This report concluded that:

> "a significant increase in construction related R&D, especially R&D aimed at improving construction productivity, will probably occur only as a result of some direct, congressionally mandated federal action. Given the seriousness of the construction industry's productivity problems, the committee is convinced that a substantial increase is needed in federal funding for construction-related R&D, especially R&D aimed at

improving productivity. Such an increase can be justified on the grounds that both the national economy and the federal government itself would benefit from lower construction cost."

Based on its findings and conclusions, the Committee on Construction Productivity made the following recommendations:

1. The Congress should formally acknowledge the need for federal leadership in conducting, funding, and coordinating general construction-related R&D, just as it has in agriculture, medicine, transportation, and many other fields. This acknowledged leadership should be reflected in federal programs.

2. In order to ensure the stability of the program, the Congress should consider methods of funding a strong federal R&D program that would provide stability and continuity.

3. In order to ensure that a broad spectrum of construction R&D needs are met, the Congress should provide for the distribution of program funds to the various federal agencies that have construction-related responsibilities; for example, some funds could be allocated to the agencies that are responsible for procuring federal facilities for R&D on the design and

construction of such facilities; some funds could be allocated to agencies like the National Bureau of Standards and the National Science Foundation for generic R&D for the entire construction community; and some funds could be allocated to information-generating agencies like the Bureau of the Census and the Bureau of Labor Statistics for the development and publication of more accurate construction statistics.

4. In formulating the program, the Congress should provide a mechanism to ensure that the construction R&D activities of the various federal agencies are coordinated and that information and technology produced through such activities are widely disseminated. To accomplish this, the Congress might consider giving a particular agency overall responsibility for managing the program and distributing R&D funds to other agencies. Alternatively, Congress might permit the various agencies to manage their own R&D programs, but require them to participate in a cooperative, coordination body (either public or private) that would do for construction R&D what the National Research Council's Transportation Research Board has done for highway research for many years.

These findings and recommendations should give Congress the necessary starting point upon which to develop legislation that will truly enhance infrastructure innovation.

ASCE ACTIVITIES

ASCE believes that its greatest contribution to meeting our infrastructure needs will be through technological innovation and the application of research and development results to both rehabilitation and new construction. The record shows that our national commitment to R&D in infrastructure development is lagging behind other types of industries in this country, such as aerospace and the chemical industry, and is also behind certain other industrialized nations in the world, such as Japan and the Federal Republic of Germany.

It appears that there is going to be a significant shortfall in the funding to meet our national infrastructure needs. We believe that the primary answer to this funding challenge is to "work smarter", and that means not only to develop new funding methods, but to develop new concepts in design, construction, rehabilitation and maintenance that will deliver greater cost effectiveness and performance for every dollar spent.

To achieve this goal we need to promote innovation and to remove those obstacles which discourage innovation. Civil engineers, for example, are under increasing pressure to be conservative in their designs because of outmoded standards and increasing liability risks. To promote creative and innovative technology, the nation's political institutions must recognize that additional risk is involved, and must provide reasonable protection from liability and litigation, and be willing to adopt new standards of design and construction. To do less will result in mediocrity.

This does not mean the safety and welfare of the public will be sacrificed. Such safety and welfare should be paramount in any infrastructure expansion or rehabilitation.

Innovation is not new, of course, and its is constantly pursued by the engineering profession. The major point to be made here is that it should be accelerated, and the best way to accomplish this is to fund research and development in the areas of infrastructure design, construction and management.

We in ASCE are committed to furthering engineering research. We have formed a Technical Council on Research that identifies areas of research needs and provides initiation grants for researchers. We have just chartered a new Civil Engineering Research Foundation to provide sustained financial support for such research activity.

ASCE is presently involved in a number of activities related to infrastructure quality and innovation. As findings and recommendations from these various activities become available, I plan to share them with the Committee.

A conference on "Civil Engineering in the 21st Century" will be held on November 11-12, 1987 in Williamsburg, VA. This conference will identify civil engineering research, design, and practice needs in the years ahead.

ASCE has also initiated a new program of peer review for government agencies. Modeled after the peer review program for the private sector, ASCE will offer peer review of design, construction and management programs to government agencies. Three pilot reviews have been completed and accepted, and we anticipate strong and growing interest in this program from public sector agencies. Peer review strengthens the design and management capabilities of engineering organizations and increases the quality of their engineering products.

Another major undertaking of ASCE is the development of a "Manual of Professional Practice for Quality in the Constructed Project." This Manual is intended to improve quality by better defining the roles and responsibilities of each member of the construction project team. In general the Manual will:

- stress the importance of quality design, construction and management concepts and practices, such as peer review, owner's expectations and objectives, proper contract procedures, communication and coordination among the team members, alternative procedures, liability, and many other aspects of design and construction.

ASCE expects to release the Manual in January, 1988.

Finally, I have asked ASCE's Technical Activities Committee, which includes almost five thousand civil engineering professionals working in virtually every dimension of improved infrastructure research and technology, to provide me with a comprehensive report on how innovation can save infrastructure investment dollars and serve the public. This report is scheduled for completion in early spring, and I believe that the Committee will find it of great interest and value.

INNOVATION PAYS OFF FOR THE PUBLIC

In order to give the Committee a clearer picture of how innovation can pay off for America, I would like to cite a few examples of civil engineering infrastructure improvements that have saved money and enhanced quality, while improving public safety and convenience.

1) The New York Department of Transportation (DOT) estimates savings of $3 million per year from innovative bridge deck rehabilitation that avoids closures and detours.

2) The Illinois DOT estimates annual savings of $865,000 from improved patching procedures for continuously

reinforced concrete pavements.

3) In Connecticut, the state DOT found that using laser videodiscs in photologging saved $4 million over five years.

4) In Iowa, the state DOT reported that strengthening of highway bridges by posttensioning saves 40% of the cost of bridge replacement, avoiding costly detours.

5) At Willow Creek Dam in Oregon, roller-compacted concrete saved one-third the construction time, reduced costs, and provided needed flood protection and water supply at minimum cost.

6) The Golden Gate Bridge deck replacement saved $4 million on a $60 million project. The deck was made wide (safer) - as were the sidewalks (more capacity) - and lighter in weight (better safety plus savings in materials-- 11,000 tons of steel). The deck was paved with epoxy-reinforced asphalt for longer wear and better skid resistance. In addition, the deck design is orthotropic welded steel, which allowed modular replacement without disrupting the traffic flow of 100,000 vehicles per day.

7) Sewer rehabilitation using in-situ lining of polyester fabric and thermosetting plastic resin, restores capacity and saves money in urban areas by eliminating the need to trench and replace (safer and less disruptive).

8) Street re-surfacing using surface profiling and recycling of asphalt has become a widespread practice, which minimizes traffic disruption, enhances safety, conserves material, and is a superior surface to straight overlay.

9) Increasing use of polyester geotextiles in road and highway resurfacing strengthens asphalt overlaps, promotes water resistance, reduces cracking, and gives longer life to old concrete and asphalt roads.

10) Surveying now uses lasers routinely for electronic grading, leveling, and distance measuring. Global positioning satellites are used for triangulation and cadastral surveys. Satellite imagery is used for pollution control and water resources management.

RECOMMENDATION

In summary, we believe that a national program to provide leadership and commitment to innovative infrastructure research and development is needed. It must be supported by adequate funding that will provide meaningful and applicable research results, together with a fresh policy to stimulate creative use of new materials and construction techniques and provide a reasonable degree of risk protection. We would like to see federal funds made available on a partnership matching basis to stimulate states, cities, other governmental units and private industry to participate. In order to ensure continuity, stability and completion of research activities, we would like to see a program that is not tied to congressional appropriations on an annual basis. Finally, we would like to see the National Science Foundation and the National Research Council's Transportation Research Board programs dealing with infrastructure needs broadened and expanded.

The American Society of Civil Engineers is committed to improving the nation's public works infrastructure. We stand ready to assist the Committee in achieving this goal.

INFRASTRUCTURE INNOVATION

Approved by the Technical Activities Committee on January 7, 1986
Approved by the Committee on Policy Review on January 9, 1986
Adopted by the Board of Direction on April 6, 1986

Policy

To encourage government officials involved in infrastructure planning as well as private citizens with an interest in infrastructure to support innovation in engineering intended to reduce construction, reconstruction, maintenance and operation costs while maintaining engineering quality and structural integrity, by:

- Supporting legislation and policies that encourage new techniques;
- Supporting legislation and policies that remove impediments to progress;
- Encouraging leadership that supports progressive planning, design, construction, maintenance and operation of infrastructure systems;
- Supporting staff people who develop creative approaches to the technical, administrative, and financial aspects of infrastructure projects;
- Using consultants and contractors who have a record of developing new approaches, recognizing that innovative methods may increase risk and cost
- Supporting research and development which may develop new technology in the fields of design construction and maintenance of the infrastructure;
- Recognizing that innovation in infrastructure technology may involve risk and additional responsibility; and
- Recognizing that innovation carries with it the additional responsibility for continuing the new processes until the project is successfully completed.

Issue

Congress estimates that there is a $450 billion shortfall in funding to meet national infrastructure needs. The primary answer to the funding challenge is to "work smarter" - to develop new ways of funding, designing, constructing, and maintaining the national infrastructure. Currently, there are a number of obstacles which discourage innovation on a widespread scale. Civil engineers, for example, are under increasing pressure to be conservative in their judgment because of lawsuits, rules, regulations, legislation, standards, competitive bidding and a desire for predictability. The benefits of innovative infrastructure technology cannot be measured immediately. Such innovation requires a long term commitment. Appropriate technical innovation should be encouraged throughout the infrastructure industry in the interest of progress, cost-effectiveness and improved quality.

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Rationale

Increasing public interest in, and reducing obstacles to, innovation is a formidable task and beyond the capability of practicing engineers acting alone. the American Society of Civil Engineers, as the representative body of the profession responsible for the design and construction of the manmade environment, is concerned with funding for infrastructure needs and considers the use of innovation as an important way to help close this gap. ASCE can bring the need for infrastructure innovation to the attention of the public and its elected representatives and officers.

November 23, 1987

The response of Mr. Albert A. Grant, President, American Society of Civil Engineers, to questions submitted by Senators Quentin Burdick and Robert Stafford following the October 21, 1987 hearings of the Senate Subcommittee on Water Resources, Transportation, and Infrastructure.

QUESTIONS FOR MR. GRANT FROM SEN. BURDICK

1. What do you think is the single most effective and feasible action Congress could take to strengthen the infrastructure of our nation?

Given the current fiscal climate, and Congressional estimates that there will be a $450 billion shortfall in funding to meet national infrastructure needs, the American Society of Civil Engineers (ASCE) believes that the primary answer to this funding challenge is to "work smarter" - that is develop new ways of funding, designing, constructing, and maintaining the national infrastructure. To remain competitive internationally, infrastructure innovation is essential.

Congress should develop legislation that promotes infrastructure research and development. In addition, Congress needs to revisit and, if necessary, modify the restrictions placed on tax-exempt financing in the 1986 Tax Reform Act.

2. You mentioned in your testimony a recently-published report on construction productivity. That report suggests some research funding options, such as a multi-year authorization, a trust fund, or a surcharge on federal construction. Does the ASCE favor any particular funding method?

ASCE supports the concept of a surcharge on federal construction (or a small fractional set-aside) to finance a Federal infrastructure innovation program. A multi-year program authorization would enhance program stability.

3. How can an appropriate balance be reached between investments in new construction as opposed to maintenance of existing facilities?

New construction should be undertaken when no facilities exist to meet projected needs or when it would not be cost-effective to upgrade or rehabilitate existing facilities.

An infrastructure innovation program can aid in the rehabilitation of existing public works facilities and prolong useful facility life, as well as the development of new construction technology. It would seem that current budgetary pressures should be strong enough to underscore the importance of maintaining and rehabilitating existing facilities. Proper maintenance, performed sooner rather than later, will avoid more costly repairs in the long-run.

4. In the October 24, 1987 issue of the National Journal, Neal R. Peirce discusses the problem of corruption in public works contracting and construction. How serious do you believe the problem to be and what remedies would you suggest?

It is difficult to measure the degree of corruption in public works contracting and construction. Certainly, any amount of corruption is unacceptable and contrary to the public interest. The FBI sting operation in New York state alluded to in Mr. Peirce's article, indeed, raises serious concerns. It must be remembered that corruption is a nettlesome and multi-faceted problem because, on the one hand, an individual seeking a contract may offer an inducement, while, on the other hand, a public official may directly, or indirectly insist on an inducement.

As a professional organization, the ASCE maintains a very strict code of ethics, which applicants must agree to comply with when applying for ASCE membership. ASCE Guidelines to Practice Under the Fundamental Canons of Ethics state:

> CANON 5. Engineers shall build their professional reputation on the merit of their services and shall not compete unfairly with others.
> a. Engineers shall not give, solicit or receive either directly or indirectly, any commission, political contribution, or a gift or other consideration in order to secure work, exclusive of securing salaried positions through employment agencies.

Adherence to and enforcement of ethical codes is a necessary part of any effort to curtail corruption in the construction industry.

Other possible remedies include wider use of peer review and ASCE's development of the "Manual of Professional Practice for Quality in the Constructed Project: A Guideline for Owners, Designers, and Constructors." An Executive Summary of the manual's Preliminary Edition for Trial Use is enclosed for your perusal. *

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*Retained in committee files.

QUESTIONS FROM SENATOR ROBERT T. STAFFORD

1. If there is a Federal government role in funding additional research and development, where should the money come from?

The Federal Government should, clearly, take the lead role in funding an infrastructure research and development program. A fractional set-aside of funds from the Federal construction budget and a multi-year authorization would provide programmatic and financial stability. Entities receiving Federal infrastructure research funding should be required to put up matching funds. A copy of ASCE's Policy Statement on Infrastructure Innovation is attached for your information.

2. Is the liability potential in research and development efforts a concern? If so, how do you believe it should be addressed?

Liability is an issue of great concern to ASCE because it impacts civil engineers working in the private sector, academia and research, and government.

In my remarks before the Environment and Public Works Committee on October 21, 1987, I stated that in order to develop new concepts in design, construction, rehabilitation, and maintenance that will deliver greater cost effectiveness and performance for every dollar spent, "We need to promote innovation and to remove those obstacles which discourage innovation. Civil engineers, for example, are under increasing pressure not to innovate, because of outmoded standards and increasing liability risks. To promote creative and innovative technology, the nation's political institutions must recognize that additional risk is involved, and be willing to adopt new standards of design and construction, consistent with public safety and welfare, and to provide a reasonable level of risk protection."

3. What effect do innovative technologies have on the labor market and job displacement? Is there any evidence that concern about job displacement is a barrier to the immediate and widespread implementation of innovative technologies?

History suggests that innovative technologies, while occasionally igniting fears of job displacement among workers, usually do not result in significant job displacement. Often times workers can be retrained to assume new and less menial job assignments. In some cases, such as with computers, many new jobs are created as a result of new technology.

Another question that should be asked here is: How many jobs will the U.S. lose, if the U.S. construction industry fails to complete effectively in the international marketplace because of inadequate research and development? In the highly competitive global market, the U.S. should feel compelled to enhance infrastructure innovation.

4. For a long time it has been a problem to convince elected officials to use new technologies and materials which have a lower life cycle cost but a higher initial cost. Is there anything that can be done to encourage these officials to use such technologies and materials?

Education! Citizens and public officials need to be sensitized to the significance of life-cycle costs, and long-term benefits versus short-term benefits. In this era of fiscal austerity, the public might well be receptive to the concept of life-cycle costs. In addition, ASCE strongly believes that the procurement of architectural-engineering services on the basis of demonstrated qualifications and experience, will enhance the life-cycle performance of a project.

Chapter Three of the Executive Summary of The Manual of Professional Practice for Quality in the Constructed Project states that:

> "The owner (or the official representative of the owner) should understand important concepts and practices such as life-cycle costs, peer review, alternative studies, value engineering, construction contract documents, and shop drawings. The owner should be cooperative, plan for proper communications, and insist that construction adheres to project requirements."

5. What specific changes do you believe should be made to patent law to encourage more R&D and technology transfer?

Patent law is a highly specialized area of the law in which ASCE has had limited, if any experience. I have not heard any complaints about current U.S. patent policy placing undue constraints on technology transfer.

Testimony of Dean Jon Epps
College of Engineering
University of Nevada-Reno
Senate Subcommittee on Water Resources,
Transportation and Infrastructure
October 21, 1987

Introduction

Mr. Chairman, for the record, my name is Jon Epps, Dean of Engineering at the University of Nevada-Reno. I would like to take a moment to thank Senators Moynihan, Symms, and Reid for providing me this opportunity to testify on the role of colleges and universities in addressing the nation's infrastructure problems. Additionally, it has been a pleasure working with the subcommittee staff as well as that of Senator Reid's office.

The Problem

The nation's infrastructure problem is most typically described in terms of catastrophes that have occurred or in terms of the enormous public investment required to solve the problem. The nation's historic commitment to construction of canals, harbors, roads, railroads, water and sewer systems, interstate highways, and airports was motivated by a desire to achieve material progress and national development. Extensive and successful programs were adopted by all levels of government to build facilities, provide jobs, and meet the economic need for transportation and a social need for public health.

Now that our infrastructure is fully developed, it is taken for granted, treated as a system one assumes will remain in place as the foundation of our economy. Today, we are frequently inclined to consider infrastructure in terms of its occasional catastrophic failures, as when a bridge collapses or a water treatment plant fails, causing loss of wildlife and extensive pollution of the environment. When such events occur, we conduct extensive studies to address cries of alarm about the decay and deterioration of roads, bridges, air travel, and our railway network. Despite what we know needs doing, we are intimidated by the enormous costs of addressing this problem.

Where once we were motivated by a desire to develop the nation, today we deliberate and delay in the shadow of national or municipal debt. Can we afford to arrest the deterioration of the national defense highway system, continue efforts to clean the nation's water, or see to the safety of surface and air transportation? Can we afford not to?

Clearly, what is needed is to encourage a renewed national commitment to public works policies that address the need for safe and efficient transportation, clean drinking water, wastewater treatment, safe dams, as well as bridges and highways strong enough to endure the combined impact of man, machine and nature.

Most of the literature, studies, and reports on the "infrastructure problem" provide extensive descriptions of decay and deterioration, case studies of successful privatization of public services, and analyses of dramatic catastrophes measured in lost lives and capital destroyed. Inasmuch as the problem is money, recommendations often concentrate on the role of user fees, trust funds, fuel taxes, and bonds in meeting the financial costs of repair, rehabilitation or new construction.

The officials of federal, state and local agencies, the Congress and state legislatures, trade groups, manufacturers, and user groups are long familiar with the infrastructure problem. Funding and wise expenditure of revenues are major areas requiring extensive definition. While I will not address the financing mechanisms that will help solve this problem, I am concerned with the cost-effective use of these resources.

As an active teacher, researcher and consultant to government and industry, it seems to me that too little attention is being paid to the origins of solutions. Design and construction of the infrastructure requires skills and expertise that originate within the nation's colleges and universities. It should be no surprise that the expertise to address repair and rehabilitation of infrastructure resides in the same location.

Research Expenditures

One recent report by the National Council on Public Works Improvement on "Highways, Streets, Roads, and Bridges" (May, 1987) indicates that the research investment level in this industry is .17% of expenditures. By way of comparison, research expenditures in high-technology industries averages 6.2% of total sales, and 3.2% of total sales in mid-technology industries such as automobiles and chemicals. In my area of expertise, pavements, a 1984 Transportation Research Board study indicates that while it accounts for "nearly one-third of all industry expenditures" it accounts for "only one-tenth of industry research funds" ("America's Highways: Accelerating the Search for Innovation," p. 45). The governments and markets that produce our highways, for example, are fragmented, decentralized, burdened by procurement policies that stifle new technologies and lack the ability to innovate. To worsen matters, this fragmentation is coupled to a decline in public spending on infrastructure from 3.5% of GNP in 1967 to 2.7% of GNP in the mid-1980s, according to the "Report of the Private Sector Advisory Panel on Infrastructure Financing"(August 1987, p. i).

The research efforts that do exist mirror the complex system of agencies, businesses and levels of government in which they operate. The Highway Planning and Research program, for example, supports state and local transportation planning and research. The Strategic Highway Research Program, with which I have previously been involved through the National Academy of Sciences, is a promising response to the need for more sponsored research on major transportation issues such as pavement management, bridge construction, asphalt concrete, portland cement concrete, and similar areas that require extensive, centralized research to achieve solutions to some infrastructure problems.

Despite these admirable and promising efforts, infrastructure remains an area characterized by low levels of public and private research investment, decentralized efforts, and fragmentation among participants.

Teaching, Research, and Public Service: The Higher Education Mission

Since passage of the Morrill Act in 1862, many of our colleges and universities have accepted and implemented the mission to teach, conduct research, and convey the knowledge gained as a public service to the citizens of our communities, their businesses, and governments.

Hence, the appropriate role of our colleges and universities is instruction founded on continuously vigorous research. These are tasks at which we excel and indeed are the missions we have accomplished as exemplified by the very infrastructure that is the subject of these hearings.

Teaching and Infrastructure

Our infrastructure-related teaching obligation is to transfer our knowledge to those who can use it in management of construction businesses, transportation planning, engineering, production of materials and equipment, or in the many public agencies that operate and regulate the nation's infrastructure.

Research and Infrastructure

Many colleges and universities conduct both basic and applied research. In our land grant institutions our obligation is to apply our findings to problems in the field by making our expertise available to public agencies and businesses. This is accomplished through providing consulting opportunities for faculty aiding public agencies and private businesses.

A Model Role for Colleges of Engineering

If I may take a minute of the Committee's time, I would like to describe what I believe to be a model role that, with proper resources and administrative foresight, our colleges of engineering can play in the process of renewing the national commitment to the public works required to arrest the decay and deterioration of our infrastructure. There is probably no other single institution in the nation that has a better track record or is more suited to providing solutions to the infrastructure problem, than the nation's universities.

Undergraduate Curriculum

To begin, our undergraduate curriculum needs to emphasize repair and rehabilitation of existing infrastructure. Continuing emphasis on building new freeways, for example, simply means our engineers will need immediate retraining on the job, while the ink dries on their diplomas. Our currriculum needs to reflect the marketplace that will confront our graduates. And our graduates need a balanced orientation to the special problems of new construction and the general problems of repair and rehabilitation of infrastructure.

Graduate Curriculum

Next, our graduate curriculum must recognize the needs of the practitioner by providing continuing education opportunities adapted to the availability of practitioners who require retraining and certification in various aspects of rehabilitation of infrastructure. Practitioner/students must be provided non-traditional degree programs that emphasize graduate education in concentrated blocks that combine evening, weekend, and summer programs that lead to degrees in specified periods of time. Programs must reflect a general public works orientation, so that mid-career students receive instruction and research that details innovative approaches to solving problems that occur in the field.

Laboratory Facilities

Campus-based facilities must emphasize test and analysis of existing infrastructure components. This means adequately large rooms to test the reserve strength of full-scale bridge components. It means laboratory facilities with adequate numbers of work stations for students and professionals seeking instruction in the latest applications of polymer materials to asphalt mix design. Where a new type of material is used in an old application, test and analysis facilities are required that rapidly provide a manufacturer the sort of information needed to define applications of the product. Laboratories and classrooms must also be capable of developing instrumentation, particularly in prototype form, for small businesses with novel approaches to old problems.

For example, in the area of highway pavement rehabilitation, with which I am professionally familiar, this means having courses and laboratory facilities available in sufficient numbers during the winter months when national construction activity is at its lowest point and personnel from industry and government are available for instructional purposes. Coincidentally, this is particularly advantageous to locations, such as Nevada, with strong tourist economies that can accomodate individuals' lodging and recreational needs in addition to their educational requirements.

Incentives

Our institutions of higher education must reform faculty incentive mechanisms. The professor/researcher must be provided with opportunities to consult with practitioners and to engage in research-based, continuing education programs. Colleges and universities must recognize and reward these activities as equivalent to instruction and basic research.

Public agencies should promote the retraining of their personnel by providing in-service education or training grants to help defray tuition and living expenses. As students complete programs, public personnel systems must adopt salary schedules that reward degree recipients.

Promising new technologies, materials and rehabilitation and maintenance techniques should be implemented to reduce infrastructure life-cycle costs. Repair and maintenance schedules should reflect new approaches. Those achieving adoption of these changes must be financially rewarded.

Public and private agencies that contract for infrastructure construction must find incentive systems that encourage the construction industry to adopt new technologies, materials and application techniques. This might take the form of incentive payments or preferential treatment for the use of innovative approaches to infrastructure repair and rehabilitation, perhaps coupled to additional payments as a project demonstrates life-cycle longevity.

Public Works Engineering

Combining our undergraduate and graduate programs with appropriate incentives, I believe, will establish an educational foundation upon which new information can be quickly transferred from research laboratory to the practitioner in the field. Indeed, I would advise my fellow deans to consider establishing degrees in multidisciplinary programs that lead to granting degrees in public works engineering.

The Case of Pavement Recycling: The Nation Benefits from a Nevada Business Cooperating with Colleges of Engineering and the Private Sector

When the oil embargo went into effect in 1973, the cost of energy and materials required for highway construction skyrocketed. The need for cost-effective pavement rehabilitation techniques suddenly became an absolute necessity. Bob Mendenhall, owner of Las Vegas Paving, is a "backyard innovator." He had developed and patented a "hot mix" plant that could recycle pavement materials for reapplication to roadway surfaces, saving about 20% in energy and materials.

The oil embargo heightened the need. Bob Mendenhall provided the basic technological concepts. Equipment manufacturers built the machines to process and apply recycled materials. The oil companies developed chemicals to help soften used materials for recycling. The Federal Highway Administration, State Departments of Transportation, counties and cities funded university-based research to develop asphalt mixtures and structural designs as well as the performance characteristics for the reapplication of old materials. This innovative process was quickly implemented and brought to practitioners through continuing education programs, short courses, and consulting activities.

I cite this case study as an ideal example of the cost-effective gains that can be made in repair and rehabilitation of infrastructure through cooperation between universities, governmental agencies, and the private sector.

Conclusion

The nation's commitment to developing its infrastructure has been a vital component of its economic success. As we address the current public works stalemate and encourage a rededication to its renewal, we must be mindful of what our colleges and universities have helped the nation accomplish. There is a great compatability between the mission of higher education, the interest of the private sector and those public agencies that fund and operate infrastructure components. Much of this debate involves meeting huge financial requirements. Let us not forget a significant public investment in our colleges' and universities' capabilities to conduct basic and applied research, undergraduate and graduate instruction. Adequate funding will certainly lead to innovative approaches and cost-effective solutions to our infrastructure problem.

UNIVERSITY OF NEVADA-RENO

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November 30, 1987

Senator Quentin N. Burdick
Chairman
Committee on Environment & Public Works
511 SHOB
Washington, D.C. 20510-6175

Dear Senator Burdick,

I am writing in reponse to your letter of October 30, 1987 regarding additional questions relating to the infrastructure hearing at which I testified on October 21, 1987. Some questions I am unable to answer. What follows therefore deals only with the items about which I believe I have an informed opinion and expertise.

The single most effective and feasible action Congress could take to strengthen the nation's infrastructure would be to adopt policies that would shorten the technology transfer process between our nation's university-based research and implementation by transportation agencies and contractor groups. In my opinion, this can be accomplished through demonstration-oriented continuing education activities for professionals and practitioners drawn to such programs from the public and private sectors.

Competitive bidding may be an impediment to innovation. This simply may be the result of outdated spcifications or fear of new techniques. It is, however, a deeply entrenched aspect of public purchasing statutes and regulations and will not be easily replaced.

One suggestion I might make to encourage the introduction of new materials and technologies would be to establish a series of experimental demonstration projects as a certain percentage of infrastructure expenditures. This category of expenditure would be subject to restricted bidding, if not sole source bids, and be required to use new materials, technologies, designs or processes.

The other questions put to me are quite beyond my expertise. Should you have need for further information, please do not hesitate to ask.

Thank you for the opportunity to respond.

Sincerely,

Jon A Epps

Jon A. Epps
Dean, College of Engineering

JAE:RED:jo

QUESTIONS FOR DR. EPPS FROM SEN. BURDICK

1. What do you think is the single most effective and feasible action Congress could take to strengthen the infrastructure of our nation?

2. Do you think that innovation and technological improvements are slowed because of competitive bidding requirements?

3. In the October 24, 1987 issue of the National Journal, Neal R. Peirce discusses the problem of corruption in public works contracting and construction. How serious do you believe the problem to be and what remedies would you suggest?

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November 30, 1987

Senator Robert T. Stafford
Ranking Minority Member
Committee on Environment and Public Works
133 SHOB
Washington, D.C. 20510-6175

Dear Senator Stafford,

This letter is in response to yours of October 30, 1987 regarding additional questions relating to the infrastructure hearing at which I testified on October 21, 1987. Some questions I am unable to answer. What follows therefore deals only with the items about which I believe I have an informed opinion and expertise.

Additional dollars for infrastructure research could be acquired by increasing the portion of research "set aside" from the Strategic Highway Research Program from 1/4 of 1% to 1 1/2 or 2%.

In my opinion, the "high initial cost, lower life cycle cost" problem is best addressed by federal regulation. When construction projects involve cooperative federal and state funding, it seems to me that certain demonstration projects could be initiated based on lower overall life cycle costs. This is particularly attractive with the recent general lowering of interest rates.

The other questions put to me are quite beyond my expertise. Should you have need for further information, please do not hesitate to ask.

Thank you for the opportunity to respond.

Sincerely,

Jon A Epps

Jon A. Epps
Dean, College of Engineering

JAE:RED:jo

QUESTIONS FROM SENATOR ROBERT T. STAFFORD

1. If there is a Federal government role in funding additional research and development, where should the money come from?

2. Is the liability potential in research and development efforts a concern? If so, how do you believe it should be addressed?

3. What effect do innovative technologies have on the labor market and job displacement? Is there any evidence that concern about job displacement is a barrier to the immediate and widespread implementation of innovative technologies?

4. For a long time it has been a problem to convince elected officials to use new technologies and materials which have a lower life cycle cost but a higher initial cost. Is there anything that can be done to encourage these officials to use such technologies and materials?

5. What specific changes do you believe should be made to patent law to encourage more R & D and technology transfer.

TESTIMONY OF

DAMIAN J. KULASH

EXECUTIVE DIRECTOR

STRATEGIC HIGHWAY RESEARCH PROGRAM

NATIONAL RESEARCH COUNCIL

PRESENTED TO

SUBCOMMITTEE ON WATER RESOURCES, TRANSPORTATION

AND INFRASTRUCTURE

OF THE UNITED STATES SENATE ENVIRONMENT

AND PUBLIC WORKS COMMITTEE

OCTOBER 21, 1987

Good morning, Mr. Chairman. I am pleased to be with you today to discuss research, development, and innovation in the field of public works infrastructure. Infrastructure is a subject of immense importance. It involves a huge expenditure of public funds; it is necessary for the smooth functioning of our economy; and it is central to our general quality of life. Unfortunately, the subject of technological innovation is often ignored as we devote attention to solving other real, pressing problems related to the condition or adequacy of our infrastructure. I commend you for your foresight in giving this subject the visibility and attention it requires as we set a course toward lasting progress in this area.

My own vantage point on this issue is as the director of a research, development, and innovation program that concentrates on highways. Roads all look the same to users, but in fact they are incredibly diverse in material composition and functional requirements. Innovations that improve the effectiveness of the combined use of varied materials are the key to better and less costly highways. The United States will spend about $400 billion before the end of this century building and replacing pavements. Research, development, and innovation that help reduce the cost of this investment--even by only a few percent--are worth tens of billions of dollars.

The scope of this committee's investigation includes all aspects of the public works infrastructure--water and sewer systems and public transportation systems as well as highways and bridges. Each of these subsectors faces its own unique technical challenges, because each involves different materials, engineering operations, and functional requirements. But we have much in common when we grapple with the crucial question of how to influence the process of innovation.

Our sewer and water systems, public transportation systems, and highway systems are all built by an industry that differs in critical ways from manufacturing industries. Many of our common problems stem from the fact that the institutional structure of the construction industry and building-materials industries provide little economic incentive for private sector researchers to develop innovative processes and products. The highway community has devoted a substantial amount of thinking and activity in the last five years to encourage more cost-effective innovation, and we believe that some of the lessons we have learned may apply to other infrastructure industries because of the common institutional problems we face.

In my comments this morning, I will address four major topics:

1. The rationale for a government role in stimulating innovation in infrastructure construction and maintenance.

2. Government roles in support of highway rehabilitation, development, and innovation.

3. How the Strategic Highway Research Program is accelerating the process of innovation in the highway sector.

4. The extent to which the Strategic Highway Research program may be useful as a model for other infrastructure research programs.

1. THE RATIONALE FOR A GOVERNMENT ROLE IN STIMULATING INNOVATION IN INFRASTRUCTURE CONSTRUCTION AND MAINTENANCE

Governments at all levels are concerned about making the most effective use of their infrastructure budgets. They have a clear interest in innovative products and processes that make infrastructure more durable or more efficient. But will such innovations come through normal market forces? Probably not as quickly as we would like. The private firms that supply materials or services to build infrastructure are often small and regionally oriented. The high costs of hauling bulky materials limits their ability to have national markets, and in the process it limits the payoff manufactures derive from in innovative materials and services. This payoff is further constrained by procurement processes that emphasize the initial costs, rather than the full life-cycle costs.

Because of this climate, some government stimulation of innovation in the building and management of infrastructure appears necessary, if the process of innovation is to be accelerated. Further, in view of the highly decentralized administrative structure through which infrastructure is provided, the federal government is best positioned to improve the incentives to innovate.

The profit incentives for innovation typical of manufacturing industries are blunted in the industries that build and manage infrastructure due to three factors: decentralization; heavy use of indigenous materials and variations in local environmental conditions; and standards and procurement processes.

Decentralization

The industries that build and maintain infrastructure are highly decentralized. Instead of a small number of major companies dominating the national market, as is the case with the automobile or aviation industries, the construction industry is both horizontally and vertically dispersed. Raw materials, construction services, and end-products are typically produced locally. Small, low-overhead organizations are encouraged by intensive cost-competition: the construction economy is highly sensitive to general economic cycles, so organizations are pressured to keep "lean" enough to survive cyclic market downturns. The prevalence of small, horizontally and vertically disintegrated organizations with low overheads means that, unlike large manufacturing conglomerates, firms in the U.S. construction industry tend not to have the resources or the incentive to develop their own research facilities.

A construction materials manufacturer seeking to sell an innovative highway maintenance product might have a potential market of four million miles of roads spread through every state, county and city. But the administration of the roads--as with all public infrastructure systems--is decentralized among several federal agencies; 50 states; 2,500 counties; 10,000 cities, towns and townships; 35 turnpike authorities; and perhaps 25,000 other local government units. While this system as a whole is huge, (the United States spent more than $60 billion on highway construction and maintenance last year), each operating agency controls only a small portion of this vast total. One by one, the manufacturer would have to compete on the basis of existing standards or to convince these agencies to alter standard procurement practices to accommodate a potentially superior product. Many manufacturers don't think it's worth the effort and risk.

Heavy Use of Indigenous Materials, and Variations in Local Environmental Conditions

Many of the construction materials used in infrastructure projects are heavy, bulky products like cement, asphalt, pipe, gravel, and sand. Economic use often dictates purchase of locally indigenous materials to avoid the high cost of long-distance hauling. This heavy use of local materials is essential, but it brings technical complications. The chemical and physical properties of the building materials vary, making it difficult to develop innovations that can be applied identically by highway agencies throughout the country.

Environmental conditions also affect materials performance, and here again, in the United States we have tremendous variations. The performance and durability of a particular highway design, for example, is dependent on the subsoil type; the severity of the weather to which it is exposed; and the volume and composition of the traffic that uses it. The major influence of site-specific factors is another reason why it is difficult to develop innovations that can be applied everywhere.

Standards and Procurement Processes

The need to protect the public welfare has necessitated standards and procurement processes for public works construction based on recognized, acceptable materials properties or construction practices. Because changing these standards and practices is difficult, they sometimes become impenetrable barriers to new product acceptance. Suppliers of new products or methods are often unable to get their products recognized, or even tested. Developers of products that are superior in particular performance aspects are often unable to capitalize on those superiorities where procurement decisions are rigidly linked to standards that are not based on those aspects of performance.

If the improvements that a supplier makes cannot be incorporated in procurement specifications, the improvements go unrecognized when procurement decisions are made. The manufacturer's incentive for innovation is lost. In highway and other public works construction, procurement procedures tend to be weighted heavily toward lowest first-cost. This emphasis on reduced initial capital costs works to the detriment of innovations that cost more initially but which increase the durability and long-term performance of the highway or other public works systems, and thus decrease the total life-cycle cost of the facility.

A producer of a new product for application in highway or other public works processes typically faces a lengthy, uphill battle to gain market acceptance. For example, in the case of improved highway pavement materials, demonstrating performance would take many years. Even if a product were successfully demonstrated in one instance, questions would remain about the product's performance in other climatic, geological, or traffic settings. Although many states have developed expedited processes to evaluate new products, suppliers of potentially innovative materials still need to subject the product to analysis by numerous states before a nationwide market can be developed. This further delays, and makes more speculative, a product-introduction process that is already tremendously long and tenuous. For every ten potential products that are successfully developed and demonstrated, only about one is eventually marketed after years of screening, analyzing, and testing. If the further impediment of stringent public agency procurement practices is added to these delays and risks, the prospects for making a profit on an innovative product are minimal.

2. GOVERNMENT ROLES IN SUPPORT OF HIGHWAY RESEARCH, DEVELOPMENT, AND INNOVATION

Because of the disaggregated nature of infrastructure manufacture, it has long been recognized that government has a legitimate role in encouraging research, development, and innovation--there being no private sector entity with sufficient incentive to undertake all of the activities necessary to assure rapid technical progress. In the case of highways, federal road research dates back to 1893, when a research program within the Office of Road Inquiry was among the first federal highway activities. The Hayden-Cartwright Act of 1934 established what has now become the Highway Planning and Research (HP&R) Program, under which states may use up to one and one-half percent of their federal highway apportionment to pay for planning and research activities. Although the original act did not explicitly cite "research" as an allowable use of these funds, it did allow "engineering investigations." "Research" was explicitly identified as an allowable use of these funds beginning in 1944. Last year, states spent more than $40 million on research through the HP&R program. This program has been an effective way to help each of the states address the many site-specific and material-specific conditions that affect the durability of highways. These conditions are often unique to a specific state, and the HP&R program provides an essential capacity to respond to specialized needs in a particular setting.

There are some common technical problems that are most efficiently addressed through centralized research. To guide and coordinate research among the states, the Transportation Research Board (originally called the Highway Research Board) was established in 1920. In addition, since 1962, the states have pooled part of their federal-aid funds to solve common problems through the National Cooperative Highway Research Program. In 1971, the Federally Coordinated Program of Highway Research and Development formalized how the Federal Highway Administration focuses its research program in conjunction with these other research activities. In short, the overall research structure that evolved had two distinct facets: state programs responding to diverse specific problems; and centralized, or cooperative programs responding to common, broadly-shared problems. Both facets have been valuable, but they left a gap.

By 1981, there were widespread problems in the condition of our highway infrastructure, and it became clear that innovative materials and processes could alleviate many of these problems. To address these concerns, the Transportation Research Board, a part of the National Research Council, formed a special committee of agency managers, university experts, and industry executives to evaluate the situation. The Federal Highway Administration provided financial support to this committee's investigation, which began in 1982.

3. HOW THE STRATEGIC HIGHWAY RESEARCH PROGRAM IS ACCELERATING THE PROCESS OF INNOVATION IN THE HIGHWAY SECTOR

In 1984, this investigation ended with the publication of the committee's findings in *America's Highways: Accelerating the Search for Innovation*. In brief, the key finding was that our existing highway research activities were performing valuable functions, but they left some critical gaps that no single agency had the responsibility or money to address. These gaps were ones where the U.S. was experiencing some of its most costly and visible highway problems. They were also ones where improved materials or processes would be exposed to a diverse array of varied field conditions in different regions of the country and on different road systems. Consistent, comparable, and thorough evaluation of innovative technologies required some form of unified attack, so that results could be successfully applied across the country. The committee's report recommended six gaps that warranted special attention in a new national program:

1. Asphalt

2. Concrete Bridge Protection

3. Concrete and Cement

4. Control of Snow and Ice

5. Maintenance Cost Effectiveness

6. Pavement Performance

They proposed that this program be funded by a set-aside of one quarter of one percent of federal-aid highway funds apportioned to the states. The states, through the American Association of State Highway and Transportation Officials voted unanimously to give high priority support to this program. Even though this implied a reduction in their highway construction apportionments, the states recognized that the potential payoffs of the program could far exceed the costs. From 1984 to 1986, the American Association of State Highway and Transportation Officials took the lead in developing detailed technical work plans for each of the topics enumerated earlier. Hundreds of technical experts, public agency officials, and industrial experts explored alternative research approaches and drafted a detailed, 500-page plan that presents a carefully reasoned approach. This plan incorporates highway managers' views of what must be solved, technical experts' judgements of what can be done, and industry and operating managers' visions of what is practical.

This plan forms the blueprint for the Strategic Highway Research Program. There are four features of this blueprint that may have implications for R&D programs in other infrastructure sectors.

First, developing a realistic research plan is a difficult and time-consuming process. Nearly four years elapsed between the initial exploration and the published plan. During this time, all of the agencies, industries, and experts involved worked hard to develop a research agenda that incorporated the perspectives of all parties in the process into a unified plan.

Second, the management of the nation's highway agencies and executives of highway-oriented industries contributed actively in this process. The exceptional degree of management involvement was essential because innovative new technologies may require new specifications, new organizational structures, new training practices, or new procurement practices. Innovation must anticipate, and proceed in concert, with changes of this sort. Strong management involvement is essential for this.

Third, the SHRP research agenda is dollar-driven: research is focused on areas where large savings in highway construction and maintenance expenditures appear possible. They are not necessarily research areas that reflect current concentrations of research expertise in highway research.

And finally, it is not a comprehensive program, but rather a highly focused one. The program does not address many related highway problems--such as congestion, safety, environmental consequences--that continue to warrant research through other programs. The Strategic Highway Research Program is not designed to stand alone; it complements the existing programs of the Federal Highway Administration and the states, using their HP&R funds. In brief, the Strategic Highway Research Program is a highly focused, industry-wide attack on a few of our most costly highway problems.

4. THE EXTENT TO WHICH THE STRATEGIC HIGHWAY RESEARCH PROGRAM MAY BE USEFUL AS A MODEL FOR OTHER INFRASTRUCTURE RESEARCH PROGRAMS

The Strategic Highway Research Program is still in its infancy, having been funded by the Congress through the Surface Transportation and Uniform Relocation Assistance Act only six months ago. Our first research contracts were let within the past two weeks. We can not assess whether this program has succeeded in its mission until it is completed, five years from now. Any advice I may offer from the perspective of one who has been involved in this program is thus unproven. Recognizing this inherent uncertainty, I would nevertheless pose for your consideration several speculations suggested by our experience.

- Infrastructure R&D tends to be neglected, and governments can provide a useful role in overcoming some of the factors that cause this. Prior to the creation of the Strategic Highway Research Program, the highway sector spent less than one fifth of one percent of its gross sales revenue on research--far less than is typical in any other industrial sector. The recognition of the need for action led to the creation of the Strategic Highway Research Program. The appropriateness of this response is reflected in the overwhelming support this program has received from both the private sectors and the states. I suspect that similar opportunities exist in other areas of infrastructure.

- It is possible, by strategically focusing on specific aspects of infrastructure, to bring together all of the technical expertise and organizational perspectives necessary to attack pressing infrastructure problems. Solutions to these problems require concerted attention by public agency managers, technical experts, and industrial suppliers. By focusing their attention on selected high priority problems, diverse parts of the organizational structure of the highway sector are developing a common understanding of these problems and are determining the appropriate actions for solving them.

- The organizations that will use the R&D should share in its financial support. This is not only equitable and efficient, it also ensures that the necessary user-agency understanding and commitment are generated. Infrastructure-building agencies must be actively involved in R&D if it is to succeed. In the Strategic Highway Research Program, all 50 states have collectively selected more than 2,000 pavement test sections to be included in the long term pavement research, and the states are active partners in this experiment. The states have also contributed loaned staff to help conduct the research, and to increase their own understanding of it. Such commitment and support is essential in order for the program's results to get into practice rapidly.

- To attack some infrastructure problems, it is necessary to build a sufficient "critical mass" of research activity. Many of the basic materials involved in infrastructure construction and maintenance are far more varied than they appear, and the demands placed upon them are diverse. Numerous uncoordinated "try it and see" experiments may never produce a coherent picture in this context. To delineate the suitability of different materials and techniques, a consistent, broad-based exploration may be the most efficient path.

Mr. Chairman, I appreciate having had this opportunity to offer some of my comments. I will be pleased to respond to any questions that you or members of the committee may have.

DR. DAMIAN KULASH'S RESPONSES TO THE QUESTIONS OF SENATOR STAFFORD AND SENATOR BURDICK

Strategic Highway Research Program (SHRP)

November 20, 1987

DR. KULASH'S RESPONSES TO SENATOR STAFFORD'S QUESTIONS

Q: If there is a Federal government role in funding additional research and development, where should the money come from?

A: I think that the organizations that use R&D should support it. This support takes two forms. First, the organizations that use R&D should share in its financial support not only because this is equitable and efficient, but also to build the necessary user-agency understanding and commitment. Second, user organizations should contribute staff time to steer, manage, and conduct the research. In our program, the state highway agencies actively participate in long-term pavement performance research both by performing some of the research tasks and by financing some of the data gathering. In addition, the states have contributed loaned staff to help conduct the research and to increase their own understanding of it. Highway-agency professionals serve on numerous advisory and expert committees within the program. Such commitment and support is essential to rapid transfer of research results into practice applications.

The money to support R&D programs should come from the users. But, because typically these users are numerous and dispersed, getting all users to agree to support this activity is difficult, and administering numerous contributions is cumbersome. By setting aside a small percentage of federal funds that would normally go to infrastructure construction or maintenance programs, and instead using them for related R&D, I believe the advantages of user financing can be obtained without a cumbersome process.

Q: Is the liability potential in research and development efforts a concern? If so, how do you believe it should be addressed?

A: I do believe liability is a concern, particularly because innovative products, designs, or processes typically have very long lives, and full-scale, in-service testing could take many years. To overcome this obstacle, accelerated tests are used whenever feasible. This is a reasonable and prudent approach, but it means that the initial field use of new techniques involves some risks. The federal government can play an important role here by supporting centralized research facilities to conduct the thorough laboratory evaluations that necessarily precede field testing. Field testing can be conducted by non-centralized organizations, such as state highway agencies.

Q: What effect do innovative technologies have on the labor market and job displacement? Is there any evidence that concern about job displacement is a barrier to the immediate and widespread implementation of innovative technologies?

A: I have no evidence that concern about job displacement has been a barrier to implementation of innovative technologies within highway agencies. Many of the recent developments in highway technology improve durability, reliability, or safety, with little effect on labor-intensity, although there are certainly some instances where new technologies have eliminated the need for some tasks. For example, the application of photogrammetry techniques has reduced the need for estimators who determine the amount of earth to be moved in order to maintain level roadbeds during road construction. Computers have made many design tasks much easier and less labor-intensive. Earth-moving itself also has been automated. High-capacity earth-moving equipment has reduced the labor-intensity of that task, so fewer skilled operators are needed to do the same amount of work. The experience in the highway industry has been that the need for highway construction and maintenance perpetually outstrips the funding and trained labor available. Thus, when labor-saving technologies are introduced, any reductions in labor requirements can free manpower for transfer to other necessary tasks. This can be more of an incentive than a barrier.

Q: For a long time it has been a problem to convince elected officials to use new technologies and materials which have a lower life-cycle cost but a higher initial cost. Is there anything that can be done to encourage these officials to use such technologies and materials?

A: This is a very serious problem indeed. As defenders of the public purse, both elected public officials and their professional hired staff face incentives that discourage innovation. The solution to this problem is more documented performance and life-cycle cost information on innovative products and technologies. If information on out-year savings were available, along with convincing evidence that the product has superior durability or longevity, then more public agencies might feel confident in using innovative technologies.

It should be noted, however, that many states have statutes requiring project design and construction contracting decisions to be based on lowest initial capital costs. These statutes frequently require project cost accounting to be based on current-year budgets, and prohibit consideration of off out-year savings. In such situations, more reliable information on performance will not lead to a change in procurement practices unless the potential life-cycle savings are sufficiently dramatic to force a change in the lowest-capital-cost statutes.

In any event, I believe that the most effective thing that can be done is to provide public agencies with objective, reliable information on potential life-cycle savings. Research using accelerated testing is a key part of developing such information. This will give agencies the performance information necessary to apply life-cycle costing effectively, and will encourage more widespread use of this technique.

Q: What specific changes do you believe should be made to patent law to encourage more R&D and technology transfer?

A: Patent laws need to provide an incentive for inventors to participate in publicly funded research programs by allowing them to retain patent rights to products that are developed from their research. The researcher/inventors should be allowed first patent rights, and be free to sell these rights to additional parties. This incentive should be balanced with protection of the public interest by allowing the government the right to license additional manufacturers should those originally licensed fail to provide the product at a reasonable price, if it is technically and economically feasible to do so. A "reasonable price" would of course be one that allowed the manufacturer a "normal" profit. I am not aware that any change in patent laws is required to do this. I believe the Department of Commerce encourages public agencies to interpret existing laws so as to give patent rights to the research performers.

DR. KULASH'S RESPONSES TO SENATOR BURDICK'S QUESTIONS

Q: What do you think is the single most effective and feasible action Congress could take to strengthen the infrastructure of our nation?

Strengthening the infrastructure requires a three-pronged attack.

First, the parts of infrastructure for which the Federal government is responsible need to be more clearly defined by Congress. The responsibility for the financing and administration of most of our infrastructure is now assumed by states, local governments, and the private sector. Some such division of responsibilities will continue into the foreseeable future. This multi-level approach is appropriate, and it is evolving continually as the nation grows, as technology changes, and as new needs emerge. Nonetheless, I believe that the Federal role that we see today is becoming inadequate in some areas. In the highway sector, the key elements of the federal role were developed twenty or thirty years ago, and there is evidence that the Congressional consensus that surrounds that defined role is unraveling. For example, the strong Congressional commitment to build the Interstate Highway System provided stability and continuity to the program from the mid-1950s to the early 1980s. As this important system nears completion, congestion and physical deterioration of roads, and construction of roads in highly developed areas are growing concerns. Yet, Congress lacks a systematic program structure to deal with the emerging needs, which vary from one region to another. Congress needs a new definition of its role to guide its programs in the post-Interstate Highway System era.

Second, once Congress has established its role and responsibilties in each area of infrastructure, it needs to provide adequate financing for them without undue uncertainty or delay. In the current system, necessary core activities, on which there is a consensus, are sometimes held hostage while Congressional debate focuses on new or local-interest activities around which there is no consensus. In the process, the federal government has been drawing back from highway finance. In 1960, twelve cents out of every highway system dollar went to roads, the rest going to vehicles, fuel and other non-road costs. Today, only six cents out of the highway system dollar goes to roads. The federal share of this support has also been declining.

Third, I believe Congress needs to devote increased attention to innovation in infrastructure. Owing to the highly decentralized structure of most forms of highway infrastructure, there is a particularly vital federal role in stimulating innovation. Long-run financing requirements can be reduced if we invest wisely in forward-looking research and development. Most infrastructure-financing programs do not do this. The percentage of overall funding devoted to R&D is typically far lower for specific modes of infrastructure than it is for almost any private-sector industry.

Q: The Administration has proposed the transfer of two of its transportation research facilities--the Transportation Systems Center and the Turner-Fairbank Highway Research Center--from the Department of Transportation to non-Federal control. What is your opinion of this "privatization" proposal?

A: I do not believe that privatization will help us use R&D as effectively as we should. The nation's total investment in tranportation sector R&D is very small when compared to R&D investments in other U.S. industrial sectors, or in comparison to transportation R&D expenditures in other countries. As noted in my testimony, the nature of the transportation industry makes it unlikely that the private sector will have the means and incentive to accomplish all of the necessary R&D by itself. If, by "privatization," you mean financing the institutions through private-sector fees or contributions, then I suspect that privatization of these facilities would eventually result in their demise, thereby further curtailing an already-limited capacity for innovation. For example, much of the work of the Turner-Fairbank Highway Research Center is devoted to coordination and implementation functions that are very valuable, but which private industry would have little interest in supporting. I believe that a more effective course than privatization is to have periodic broad-based evaluation of federal laboratories and use this process to target these resources on needed activities that other organizations are unable to address.

Q: The SHRP program represents a major research effort. What additional highway research needs have you identified above and beyond the scope of the SHRP study?

A: We are indeed a major research program, representing a comparatively large funding commitment. But we are also a highly focused program concentrating on short-term, problem-solving projects in four very specific highway research areas: asphalt; pavement performance; highway operations; and concrete and structures. These are very important topics, particularly considering the size of public expenditure in these areas. Nevertheless, our program does not devote extensive attention to many additional important concerns such as traffic congestion, traffic safety, environment, traffic engineering and control, accelerated pavement testing, planning, or long-term basic research. I believe that many research needs exist in these areas, and that the most effective way to identify those that deserve attention is to get highway-agency users, industrial suppliers and technical experts together to focus on what can be done and what must be done. There are virtually limitless numbers of research opportunities and virtually limitless numbers of problems. Undirected financing of research or problem-solving could be very costly and might not yield useful products. The key to avoiding this pitfall, I believe, is to identify "research needs" through a process that forces some convergence between practical needs and theoretical possibilities.

Q: In the October 24, 1987 issue of the National Journal, Neal R. Peirce discusses the problem of corruption in public works contracting and construction. How serious do you believe the problem to be and what remedies would you suggest?

A: It is very difficult to know how serious this problem is. Nothing that I have seen or read suggests that it is widespread.

A suggestion was made in the Neal R. Pierce article that some five or ten percent of construction contract funds be held up until some period after the work is completed, and that if corruption is subsequently found, an appropriate penalty could be taken from the withheld funds. If such an approach were adopted, I believe the concept could be extended usefully to cover performance guarantees generally. That is, if a constructed facility makes it past certain early milestones without demonstrating any of the problems that sometimes appear at these milestones, then a performance-oriented contract payment would be made. This could include a corruption-based checkpoint as well as various performance-based checkpoints. Such a process would need to be thought through carefully, but I believe it could help stimulate higher-performance construction.

Congressional Research Service
The Library of Congress

Washington, D.C. 20540

September 10, 1987

TO : Senate Committee on Environment and Public Works
Attention: Mike Weiss

FROM : American Law Division

SUBJECT : Potential Legal Barriers to Infrastructure Research and Development in the Areas of Federal Taxation and Public Contracting

This memorandum is furnished in response to your request for identification and explanation of potential legal barriers to infrastructure research and development raised by the federal tax laws and the regulation of public contracting.

The majority of issues discussed in this paper are those raised in the Office of Technology Assessment Staff Paper, entitled "Construction and Materials Research and Development for the Nation's Public Works," dated June 1987 (hereinafter referred to as the OTA report). Many of the issues referred to in the OTA report as legal issues are apparently so identified because there is no law in the U.S. of a specific nature to be utilized to positively promote research and development. For example, the OTA report notes that Japan has a special tax deduction for infrastructure research and development expenses, OTA report 4-3, or Europe utilizes "design competition contracting," OTA report 5-5, while this type of incentive is not available here. This type of "barrier," while susceptible to policy or economic analysis, does not lend itself to a legal discussion and so has been omitted from this paper.

Section references contained in the federal tax portion of this memorandum are to sections of the Internal Revenue Code of 1986 (hereinafter referred to as the Code).

Federal Tax Laws

It should first be noted that the Internal Revenue Code does not contain any direct barriers to research and development in the infrastructure area, i.e. there are no provisions which say infrastructure research and development expenses are not deductible or no credit shall be allowed for research and development expenses carried on for a public works project. Rather, the barriers in the tax area arise from the fact that research and development incentives in the Code may not be as readily adaptable to the research and development necessary for infrastructure as say to the research and development needed in the more high tech areas of our economy. Also, the OTA report suggests that the types of business concerns involved in infrastructure projects tend to be low profit margin with payback on research and development coming over a long time period, again, making the code research and development incentives less attractive. There are two major incentives to research and development in the Code, section 174 providing for deduction or amortization of research and experimental expenses and section 41 providing a credit for increasing research activities.

Section 174 allows two methods of treating research or experimental expenditures paid or incurred by the taxpayer in connection with his trade or business. The expenditures may be treated as deductible expenses or the taxpayer may elect to capitalize them, and if no other means of amortization is provided, they may be written off over a period of not less than 60 months, beginning with the month in which benefits from the research are first realized.

There is no statutory definition of research and experimental expense to be found in section 174. The Internal Revenue Service, in its regulations, has interpreted this phrase to mean expenditures "which represent research and development in the experimental or laboratory sense" Treas. Reg. §1.174-2(a)(1). While this definition does include some development costs (such as development of an experimental model, a plant process, a product, a formula, or an invention), it does appear to be more limited in scope than the term "research and development expense."

The expenses must be incurred in connection with the taxpayer's trade or business. This requirement has been more liberally interpreted than the similar requirement of §162 (ordinary and necessary business expenses). The Supreme Court has defined the scope of §174 to include deductions not only for expenditures of an on-going business, but also those of the investors in, and the invention of, a product which is neither patented nor marketed. Snow v. Commissioner, 416 U.S. 500 (1974).

If section 174 did not exist, research and development expenditures would have to be capitalized, with recovery allowed through deprecation allowances and/or an eventual abandonment loss or taxable disposition of the property. Red Star Yeast and Products Co., 25 T.C. 321 (1955); See also, S. Rept. 83-1622, 83rd Cong., 2nd Sess., 215 (1954) which states "the taxpayer who does not elect to treat research and experimental expenditures under the methods provided for in this section may capitalize the full amount thereof." Instead of capitalization section 174 offers two alternative treatments of these expenditures. These expenses may be deducted currently or they may be deferred through a system of amortization.

The selection of method by a taxpayer may be affected by many factors particular to his individual business, but the factor most likely to be predominant is the existence or nonexistence of current income needed to be offset by current deductions. If there is current income, the current expense method of 174(a), absent some subjective factor, is the preferred method. This method is simpler and more easily utilized in many ways. To elect the current expense method, one only need use it, i.e. deduct the expenses on the taxpayers return. Under the deferred method, an election must be made in accordance with the regulations. A faulty election will result in the loss of the deduction and force capitalization of the expenditure.

The current expense method may be used to deduct expenses even when the result of the research is depreciable property. Section 174(b)(1)(c) specifically denies deduction under the deferred method when the result of the project is depreciable property.

Two other complications avoided by utilization of the current expense method are that no write-off period need be selected or determination as to when realization of benefits from expenditures begins. Under the deferred method, the taxpayer is required within the first year of a project to select the period over which the research and experimental expenditures are to be written off. One would want this period to coincide with the period of benefit from the project. Of course this period is at best difficult to ascertain at the early stage when it must be chosen. Under 174(b)(1)(c) the amortization period begins in the first month that benefit is realized from the project. The regulations require that the taxpayer adhere to the amortization period originally selected (even if benefits cease) unless a different period is authorized by the commissioner. Treas. Reg. §1.174-4(a)(5).

The deferred method also creates problems when the project fails. Under this method, where the project fails, recovery is only allowed through an abandonment loss deduction. Under the current expense method the deductions have already been taken when the project is abandoned and so there is no problem.

Because of its complexity and other disadvantages outlined above, the deferred method is most apt to be utilized only when there is a lack of current income to be offset. This occurs primarily when the research is being carried on by a new corporation with no other operations, but can occur in the type of business, described in the OTA report, with low profit margins and research projects whose return will be spread out over many years.

Section 41 provides a tax credit for increasing research activities. The Tax Reform Act of 1986, Pub. L. 99-514, extended this credit for eligible expenses paid or incurred through 1988 and modified it to more accurately target research that is technological in nature and useful in developing new or improved business components for sale or use in carrying on the taxpayers trade or business. Joint Comm. on Taxation, 100th Cong., 1st Sess., General Explanation of the Tax Reform Act of 1986 (Comm. Print 1987).

Under prior law, the credit was 25% of qualified research expenses minus the average research expenses in the base period (usually the preceding 3 years). 65% of contract research expenses (for work done by others) counted as research expenses. The credit as amended by the 1986 Act is reduced to 20%, the definition of qualified research is narrowed, and a new credit for basic research replaces the qualification of contract research expenses.

The amended credit, as did prior law, limits qualified research to research with respect to which expenditures may be treated as expenses under

§174. The credit is now further limited to research which is undertaken for purpose of discovering information which is technological in nature, the application of which is intended to be useful in the development of a new or improved business component of the taxpayer, and substantially all of the activities of which constitute elements of a process of experimentation.

The conference report clarifies that research is technological in nature if the process of experimentation utilized in the research fundamentally relies on principles of physical or biological sciences, engineering, or computer science. H. Rept. 99-841, 99th Cong., 2nd Sess., Vol. II, 72 (1986).

Business component is defined as a "product, process, computer software, technique, formula or invention that is held for sale, lease, or licence" or "used by the taxpayer in a trade or business of the taxpayer." §41(d)(2)(B).

The conference report defines the term process of experimentation as "a process involving the evaluation of more than one alternative designed to achieve a result where the means of achieving that result are uncertain at the outset." H. Rept.; Vol. II at 72. The process of experimentation must be for a purpose related to a new function, performance, or reliability. §41(d)(3)(A).

Under 41(d)(2)(A) the analysis as to whether research is "qualified" is applied separately to each business component of the taxpayer. For example, if research for the development of a whole new machine does not meet all the tests, the development of a specific part of the machine may still qualify.

§41(d)(4) specifies expenditures which are not eligible for the credit even if they would meet the technological information, experimentation, and functional purpose tests. They include expenses: (1) with respect to a business component after beginning of commercial production, (2) to adapt an existing business component to a particular customer's need, (3) for efficiency surveys or marketing studies, (4) for reproducing an existing business component of another person, (5) for research conducted outside the United States, or (6) for research to the extent funded by any grant, contract, or otherwise by another person or government entity.

Section 41(e) sets forth the new basic research credit. The credit is 20% of the excess of corporate cash expenditures for university basic research minus a sum calculated under a formula to assure this reflects new corporate giving, not just redirection of monies that would have been donated anyway. A qualified expenditure is a cash expenditure paid pursuant to a written agreement between the taxpayer corporation and a qualified organization for "basic research" to be performed by the qualified organization. §41(e)(7)(A).

The design of these two research credits does not on its face bar use in the infrastructure area. Even the limiting of the credits toward more technological research would not appear to eliminate expenditures of the type described in the OTA report. The utilization of these credits in the infrastructure area, like the use of section 174, seems more likely to be influenced by the economic and other subjective factors which affect these types of businesses, than any legal impediments.

Public Contracting and Procurement

The OTA report raises three main issues in the contracting and procurement area that are potential barriers to research and development and innovation in the infrastructure field. These three issues are: complexity and multiplicity of procurement regulation and standard systems, the tilt of the low-bid contract competitive system towards existing technologies, and division of public works projects into design and construction phases. The legal component of these issues will be discussed below along with a description of "value engineering" and its application to infrastructure research and development.

The complexity and multiplicity of procurement regulations on the federal level results from the many different agencies and administrations involved in infrastructure contracting. The recent trend in the federal level has been toward uniformity and codification of policies and procedures for acquisition by all executive agencies. Pub. L. 93-400, 88 Stat. 796, 93rd Cong., 2nd Sess. (1974) established the Office of Federal Procurement Policy (OFPP) and required the Administrator to establish a system of coordinated and, to the extent feasible, uniform procurement regulations for the executive agencies. In January of 1978, with the cooperation of the Department of Defense and General Services Administration, the Administrator launched the Federal Acquisition Regulation project. On July 10, 1980, OFPP issued Policy Letter 80-5 which initiated the Federal Acquisition Regulation (FAR) system. On March 17, 1982, E.O. 12352 directed that DOD, GSA and NASA continue their joint efforts to consolidate their common procurement regulations into a single simplified FAR by the end of 1982. On September 19, 1983, the FAR was published in the Federal Register, 48 FR 42103 (1983) with an effective date of April 1, 1984. Except where expressly excluded, the FAR applies to all federal acquisitions. FAR 1.103. This means "the acquiring by contract with appropriated funds of supplies or services (including construction) by and for the use of the Federal Government through purchase of lease." FAR 2.1.

The multiplicity problem on the state level, of course, is a result of our federal system which gives us 50 different governmental entities establishing procurement regulation systems. The problem is further complicated by the many local entities within each state which again have their own procurement system. Although not as successful as the federal system, there has been some movement on the state level toward more uniform procurement regulation systems. The American Bar Association in 1978 adopted a Model Procurement Code (MPC) for state and local governments and in 1980 put out a set of recommended regulations (MPCR) to implement this code.

The MPC does include a section which could be used to exempt bridge, highway or other heavy or specialized construction from the requirements of the code. MPC 2-303. But the commentary under this section states "centralized responsibility for procurement is preferred . . . . Experience has shown that a cohesive and integrated procurement system, rather than one which is fragmented or diffused, will promote efficiency and economy and will best conserve the taxpayers' monies."

In the area of standards systems or specifications, the FAR does not address the problem raised in the OTA report of the existence of so many different governmental and private organizations which set out "acceptable standards" for different types of public works projects. In construction contracts the FAR requires that "references in specifications are to widely recognized standards or specifications promulgated by governments, industries or technical societies." FAR 36.202.

The main thrust of the FAR's stated policy on design specifications is to encourage competition by keeping requirements to a minimum to allow a variety of products or services to qualify. FAR 10.002. This policy while perhaps allowing a new product or process to qualify, would appear to be a barrier to utilization of such product or process if the initial cost is higher than the more conventional method which would also qualify.

The OTA report contends that the awarding of contracts on a "low bid" basis is a barrier to innovation and research and development in that new systems or components often cost more initially and therefore their utilization in a bid might cost the contractor the award. The FAR does require sealed bidding in construction contracts. FAR 36.103. The contract award must be made to the responsible bidder whose bid, conforming to the invitation, will be most advantageous to the Government, considering only price. FAR 14.407-1. The award must be justified as the lowest bid or with the reasons for rejection of all lower bids. FAR 14.407-7. The MPC has requirements very similar to those found in the FAR. MPC 3-201 and 3-202.

Both the FAR and the MPC require this type of award for public works contracts on the basis of fairness and cost savings. See, S. Rept. 98-50, 98th Cong., 2nd Sess. (1984) and MPC 3-201, comment (2). The above cited Senate report is the report to accompany S.338 of the 98th Congress, the Competition in Contracting Act of 1984. S.338 was inserted in the Deficit Reduction Act of 1984, Pub. L. 98-369, 98th Cong., 2nd dess. (1984). S. Rept. 98-50 also notes that competition may also promote significant innovative and technical changes. In some cases, competition serves as an incentive for firms to be more progressive in developing cost-reducing design changes and improvements in manufacturing technology in order to gain advantage over their competitors. S. Rept. 98-50, p. 3. This finding is not necessarily a contradiction to the OTA reports conclusion. The cost-reducing changes referred to in the Senate report appear to be a kind that reduce up-front costs thus allowing submission of a lower bid. The type of innovation which the OTA report concludes is discouraged by use of the low-bid system is that where savings are realized later in time through longer useful life of materials or in less maintenance, but which has a higher up-front cost.

The OTA report concludes that the separation of the design phase from the construction phase is a barrier to innovation in that the requirements and specifications of the contract are already established before the contractor has any input. The FAR does require that "no contract for the construction of a project shall be awarded to the firm that designed the project or its subsidiaries or affiliates, except with the approval of the head of the agency." FAR 36.209. This appears to be an extension of the policies expressed in parts 10 and 14 of the FAR to eliminate undue influences on the specification setting procedures. If a bidder could help establish the specifications of the contract, they might tailor the requirements so as to give themselves an advantage. Unnecessarily restrictive specifications or requirements that might unduly limit the number of bidders are prohibited. FAR 14.101. Agencies shall include specifications that permit full and open competition and include restrictive provisions only to the extent necessary to satisfy the minimum needs of the agency. FAR 10.002.

The MPC, while maintaining the separation of the design and construction phases, does seek to alleviate the problems raised by this system by allowing the use of a "construction manager." The construction manager is a person experienced in construction who has the ability to evaluate and to implement plans and specifications as they affect time, cost, and quality of construction and the ability to coordinate the design and construction of a project. MPCR 5-201.03.5. While having the disadvantage of adding to the cost of the project, the construction manager adds construction expertise to project design and gives continuity to the entire project. MPCR 5-201.08.3.

The OTA report notes one type of incentive for innovation in the procurement area, value engineering. OTA 5-4. Value engineering is the formal technique by which contractors may (1) voluntarily suggest methods for performing more economically and share in any resulting savings or (2) be required to establish a program to identify and submit methods for performing more economically. FAR 48.101. Most federal construction contracts are required to include value engineering clauses. FAR 48.202 and 52.248-3.

A value engineering change proposal (VECP) is a proposal "[w]hich requires a change [to the instant contract] to implement; and [r]esults in reducing the contract price or estimated cost, without impairing its essential functions or characteristics." FAR 58.248-3. In the construction context two types of savings are recognized, instant and collateral. FAR 48.104-1. Instant savings are the reduction in contractor cost of performance resulting from the acceptance of the VECP minus the contractors development and implementation costs. Collateral savings means measurable net reductions resulting from a VECP in operation, maintenance, or logistic support. FAR 58.248-3. The contractor receives a set percentage of the savings under a formula found in FAR 58.248-3(f)&(g).

VECP's are more adaptable to innovations which bring instant savings due to the problems inherent in calculating collateral savings in the future. The length of time it takes to demonstrate that a process or material will actually perform better over the time periods involved in public works type projects is a potential problem in awarding shares for collateral savings. If the head of the contracting agency determines that the cost of calculating and tracking collateral savings will exceed the benefits, the VECP may be rejected. FAR 52-248-3 (Alternate I).

Conclusion

The legal barriers to infrastructure research and development in the federal taxation and procurement areas appear to be more indirect than direct. The tax code contains no direct prohibitions on deductions for these types of expenses. The barrier, if there is one, is more a result of the type of business entity involved in infrastructure projects not being as readily adaptable to the tax incentives provided for research and development as those involved in more high-tech industries for which the incentives were designed.

In the procurement area, the multiplicity of regulatory systems and standards setting organizations, the low-bid method of awarding contracts, and the division of design and construction phases of public works contracts do appear to indirectly deter innovation and research and development, especially of the type where major savings come in collateral costs as opposed to immediate cost savings. The centralization of federal regulation in the FAR and the use of MPC may somewhat alleviate this first problem. The problem of accurately calculating the benefits of innovations whose benefits are primarily far down the road, as well as the effect changes in the law might have on the basic policies of maximum competition in contracting and fairness, mitigate against any simple solution to the second two.

Value engineering seems to be an under-utilized incentive for innovation in the infrastructure area. Again, it does seem to be weighted toward changes which provide more immediate and easily calculated returns.

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The Library of Congress

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October 28, 1987

TO : Senate Committee on Environment and Public Works
Attention: Mike Weiss

FROM : American Law Division

SUBJECT : Possible Patent Law and Takeover Problems Concerning Infrastructure Research and Development

The enclosed memorandum is submitted in response to your request of June 25, 1987.

Introduction

An invention can be patented only if it fits within one of the classes of subject matter for which federal statutes allow patentability.[1] Only those inventions which consist of "any new and useful process, machine, manufacture," or any new and useful improvement to one of the foregoing may receive a patent.[2] Further, in order for an invention to receive a patent, it must satisfy the federal statutory requirements of novelty and utility.[3] These requirements and the way in which they have been interpreted by the courts have arguably caused some problems for obtaining patents for infrastructure improvements resulting from research and development efforts. Other occurrences, such as the cutback in funds for research and development available to corporations because of the recent increase in hostile corporate takeovers, have also created difficulties for businesses which wish to obtain patents for infrastructure improvements. This report will briefly discuss these possible problems caused by the federal patent statutes and by other occurrences in the business world. Reference to possible problems caused by federal patent statutes should not necessarily be construed as criticisms of these statutes; there may be countervailing considerations that argue in favor of the statutes as they stand.

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[1] Chisum, Patents, sec. 1.01.

[2] 35 U.S.C. sec. 101.

[3] 35 U.S.C. secs. 102 and 103.

Federal Patent Statutes

An invention is entitled to receive a patent only if it fits within one of the statutory classes of subject matter.[4] The purpose of having statutory classes of subject matter is to limit patent protection to certain specified fields concerning applied technology, areas which the United States Constitution refers to as the "useful arts."[5] This requirement rules out the patenting of theoretical and abstract discoveries as well as discoveries in the nontechnological arts such as the liberal arts, social sciences, and business management. Thus, a patent may be granted only for a "new means of achieving a useful end or result."[6]

Because of this requirement, discoveries involving improvements to the infrastructure may be difficult to qualify for patents. Many discoveries which would improve bridges, roads, sewer systems, and other infrastructure facilities cannot be considered completed processes or discoveries. Instead, technologies or materials may consist of steps which lead only eventually to a completed process or discovery, although they may presently be useful as a measure for improving the infrastructure. For example, it is likely that an entirely new process for road resurfacing would qualify for the issuance of a patent, but a change in one aspect of a currently used process involved in road resurfacing may not be patentable because it does not fit within one of the patentable classes of subject matter; i.e., it is not a "new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof."

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[4] 35 U.S.C. section 101 states:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

See also, Kewanee Oil v. Bicron Corp., 416 U.S. 470, 483 (1974), in which the Court states that "no patent is available for a discovery, however useful, novel, and nonobvious, unless it falls within one of the express categories of patentable subject matter of 35 U.S.C. [sec.] 101."

[5] Article I, section 8, clause 8 of the Constitution states:

> The Congress shall have Power... To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.

[6] Chisum, Patents, sec. 101.

Three of the four classes of statutory subject matter, machines, manufactures, and compositions, may be grouped as products. The courts have had for the most part only limited conceptual problems in determining whether certain inventions fit within these statutory definitions. Early Supreme Court cases defined "machine,"[7] but it should be noted that a patent cannot be obtained on the function of a machine.[8] The definition of a composition of matter has been stated as follows:

> A composition of matter is an instrument formed by the intermixture of two or more ingredients, and possessing properties which belong to none of these ingredients in their separate state.... The intermixture of ingredients in a composition of matter may be produced by mechanical or chemical operations, and its result may be a compound substance resolvable into its constituent elements by

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[7] *See, e.g.*, *Coup* v. *Weatherhead*, 16 F. 673 (D.R.I. 1983, *rev'd on other grounds* 147 U.S. 322 (1893), and *Corning* v. *Burden*, 56 U.S. (15 How.) 252 (1853).

[8] See Chisum, *Patents*, sec. 1.03[7].

> mechanical processes, or a new substance which can be destroyed only by chemical analysis.[9]

"Manufacture" has been defined as a "comprehensive class of inventions" that includes "every article devised by man except machinery upon the one side, and composition of matter and designs upon the other."[10]

Research and development investment with respect to improvements in the infrastructure may be made in all three of these statutory areas-- machines, compositions of matter, and manufactures. Yet, practically speaking, it would appear that the environment within which infrastructure research and development occurs may not be conducive to patenting the new technologies and materials which result. For example, such technologies and materials must have a high degree of safety. Governments and corporations are typically extremely reluctant to use technologies or materials for infrastructure facilities affecting large numbers of people unless they have been proven safe over a long period of time. The time which it takes to patent a machine, composition of matter, or manufacture and the necessity for assuring that it is a completed technology or material and not a step in developing another end-product may deter research and development investment in the infrastructure area. The advantage which a company receives from developing an improved construction technology may last only a short time until it is known to other companies. This, too, would seem to make investment in infrastructure research and development less attractive than investment in some of the more patentable areas. As stated by the Office of Technology Assessment:

> In terms of basic research, the gaps in infrastructure R&D are substantial. There is almost no research on, or

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[9] Chisum, Patents, sec. 1.02[2].

[10] Chisum, Patents, sec. 1.02[3].

> expectation of profit from, research toward developing totally new methods of delivering transportation, water supply, and wastewater disposal services. There even is little basic research on new materials, such as a totally new material for building roads. Moreover, few agencies or organizations are researching the public works applications of advanced technologies and materials (e.g., ceramics and composites) that were not developed specifically for infrastructure.[11]

Process claims, as contrasted with product claims (products consisting of the other three classes of statutory subject matter; i.e., machines, manufactures, and compositions), have been especially troublesome in claiming patent protection.[12] A process is typically considered not a structural entity but rather an operation or series of steps which leads to a useful result. One of the earliest discussions by the Supreme Court of process patents is the case Corning v. Burden,[13] in which the Court distinguished between processes and machines:

> The term machine includes every mechanical device... to perform some function and produce a certain effect or result. But where the result or effect is produced by chemical action, by the operation or application of some element or power of nature, or of one substance to another, such modes, methods, or operations, are called processes.... The arts of tanning, dyeing, making water-proof cloth, vulcanizing India rubber, smelting ores, and numerous others are usually carried on by processes, as distinguished from machines.[14]

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[11] Office of Technology Assessment, Construction and Materials Research and Development for the Nation's Public Works (staff paper June 1987), at 1-20.

[12] It should be noted that several congressional bills have language amending the patent process. S. 568 is typical. It prohibits the importation into the United States of goods made overseas by use of a United States patented process without the payment of royalties to the inventor.

[13] 56 U.S. (15 How.) 252 (1853).

[14] 56 U.S. (15 How.) at 267-268.

Perhaps the most frequently-quoted definition of a process is from the Supreme Court case Cochrane v. Deener:[15]

> That a process may be patentable, irrespective of the particular form of the instrumentalities used, cannot be disputed. If one of the steps of a process be that a certain substance is to be reduced to a powder, it may not be at all material what instrument of machinery is used to effect that object, whether a hammer, a pestle and mortar or a mill. Either may be pointed out; but if the patent is not confined to that particular tool or machine, the use of the others would be an infringement, the general process being the same. A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performend upon the subject-matter to be transformed and reduced to a different state or thing. If new and useful, it is just as patentable as is a piece of machinery.[16]

Despite these early Supreme Court cases defining a process, courts have continued to face the issue of defining process on a case by case basis.[17] One frequently stated rule is that a patent may not be obtained for the discovery of a principle or an abstract idea.[18] However, a patent may be obtained for a new product or process which uses a newly-discovered principle for the purpose of achieving a useful end.[19] A certain irony has been noted in the fact that the patent law does not grant patents to the discoverers of general scientific principles:

> Epoch-making "discoveries" or "mere" general scientific "laws," without more, cannot be patented.... So

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[15] 94 U.S. 780 (1877).

[16] 94 U.S. at 787-788.

[17] See e.g., Diamond v. Diehr, 450 U.S. 175 (1981); Parker v. Flook, 437 U.S. 584 (1978); and Gottschalk v. Benson, 409 U.S. 63 (1972).

[18] See Howes v. Great Lakes Press Corp., 679 F.2d 1023 (2d Cir. 1982), and General Battery Corp. v. Gould, Inc., 545 F. Supp. 731 (D. Del. 1982).

[19] See Diamond v. Diehr, 450 U.S. 175 (1981), and MacKay Radio & Tel. Co. v. Radio Corp. of America, 306 U.S. 86 (1939).

> the great "discoveries" of Newton or Faraday could not have been rewarded with such a grant of monopoly. Interestingly enough, apparently many scientists like Faraday care little for monetary rewards; generally the motives of such outstanding geniuses are not pecuniary.... Perhaps (although no one really knows) the same cannot be said of those lesser geniuses who put such discoveries to practical uses.[20]

It appears that many improvements in the infrastructure could be brought about by new processes. Because of the difficulty which seemingly still exists under patent law in determining exactly when there exists an identifiable new process as opposed to a step in developing a process, and for reasons discussed above such as the necessity for testing a new material or technology for complete safety before using it in a structure with which many people come into contact, it is possible to argue that current United States patent laws deter investment in research and development concerning infrastructure improvements. If, for example, steps in developing processes were permitted to be patented, it might be possible to test these steps sufficiently for safety without the worry that, once they are used without being patented, they will be known and therefore useable by others in the construction industry. Such a change in the patent laws might lead to the infusion of more investment money into research and development in the infrastructure area.

There is also the limitation relating to the eligible subject matter requirement that new uses for a known material or method already known are not patentable. As stated in Chisum:

> Discussions of the "new use" doctrine often fail to relate it clearly to a statutory source. Potentially, a claim for a new use can be viewed as nonpatentable (1) because it is not within the classes of eligible subject matter under Section 101, (2) because it lacks novelty under Section 102(a), or (3) because it is obvious in the

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[20] Katz v. Horni Signal Mfg. Co., 145 F.2d 961 (2d Cir. 1944).

> of the prior art under Section 103. In fact, the new use doctrine contains elements of all three statutory sources.[21]

This requirement would also appear to discourage investment in research and development concerning infrastructure improvements in that known infrastructure materials might be discovered to have new and particular uses. However, without the permission to patent these new uses, a discoverer of such a new use likely would find that his new use for an existing material has quickly spread throughout the construction industry. It should be noted that this rule of new uses is tempered by the doctrine of slight changes, which permits patentability if an existing product or process is altered slightly to fit the new use discovered by the inventor.[22]

In addition to the federal statutory requirement that subject matter be eligible for the issuing of a patent, there is also the requirement that an invention possess novelty; i.e., an invention must be new at the time of discovery in order to be patented.[23] The federal statutes set forth three conditions for the meaning of new: (1) No patent may be granted for an invention which is known or used by others in this country or patented or described in a printed publication in this country or in a foreign country;[24] (2) A patent will not be issued if the invention is described in a patent granted on an application filed previously;[25] (3) A person is not entitled to a patent if before the applicant's invention the invention was made in this country by another who did not abandon, suppress, or conceal it.[26]

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[21] Chisum, Patents, sec.1.03[8].

[22] See series of opinions by Judge Hand: Tristel Marble Co. v. U. T. Hungerford Brass & Copper Co., 18 F.2d 66 (2d Cir. 1927), and H.C. White v. Morton E. Converse & Son Co., 20 F.2d 311 (2d Cir. 1927).

[23] 35 U.S.C. sec. 101 requires that a patent may be issued to "[w]hoever invents or discovers any new [emphasis added] ... process, machine, manufacture, or composition of matter, or any new [emphasis added] ... improvement thereof.

[24] 35 U.S.C. sec. 102(a).

A strict interpretation of the novelty requirement might be a deterrent to investment in infrastructure research and development. Many research and development projects concerning the infrastructure appear to be related to improvements in existing designs and processes. Such research is not developmental and does not consist of new technologies. Instead, these projects "aim at knowledge or techniques that manipulate existing and available construction technologies to obtain more appropriate, more efficient, more cost-effective, or better quality infrastructure results."[27] However, it is likely under the present federal patent statutes that such improvements may in many cases not be patentable, thus cutting further into incentives to invest in infrastructure research and development.

Utility is another statutory requirement which must be met in granting a patent.[28] The purpose of the utility requirement is to make certain that society obtains a quid pro quo by obtaining a "substantial utility" and "specific benefit in currently available form" before granting a monopoly in the form of a patent to an inventor.[29] According to Chisum:

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[25] 35 U.S.C. sec.102(e).

[26] 35 U.S.C. sec. 102(g).

[27] OTA staff paper, at 2-7.

[28] 35 U.S.C. section 101 states in pertinent part:

> Whoever invents or discovers any ...useful [emphasis added] process, machine, manufacture, or composition of matter, or any ...useful [emphasis added] improvement thereof, may obtain a patent....

[29] Brenner v. Manson, 383 U.S. 519, 534-535 (1966).

> To comply with the utility requirement, an invention need not be superior to existing products or processes. However, it must meet three tests. First, it must be operable and capable of use. It must operate to perform the functions and secure the result intended. Second, it must operate to achieve some minimum human purpose. Third, it must achieve a human purpose that is not illegal, immoral or contrary to public policy.[30]

Again, a strict interpretation of this statutory prerequisite for the granting of a patent might operate to deter investment in infrastructure research and development. It might be argued that the utility of infrastructure research results might not be immediately known. A construction process or a building material might be discovered which needs a relatively long period of evaluation before it can meet the utility requirement. Yet, under a strict interpretation of the statutory requirement, the process or material may be used by others with impunity because of the inability of the inventor to obtain a patent.

Impact Of Takeovers On Research And Development[31]

Until the late 1960's there was no federal legislation and very little state legislation that regulated takeovers; instead, most corporate acquisitions were made by proxy fights, which were strictly regulated by federal statutes.[32] Some experts speculate that takeovers and takeover attempts increased in the 1960's because corporate bidders wished to speed up the entire merger process and did not want to have to comply with what they believed to be unnecessarily onerous proxy rule disclosures.[33] In this unregulated atmosphere takeovers could be completed in a very short time, and management would often not have time to structure defense tactics. Hostile takeovers became more common, and some charged that shareholders were being deceived by both bidders and management. Until 1968 there was little recourse available to those injured by this deception. In response to calls for reform by both the business and investment communities and to assure a more "level playing field," Congress enacted the Williams Act.[34]

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[30] Chisum, Patents, sec. 4.01.

[31] For a more detailed treatment of takeovers, see Seitzinger, "Securities Law: Background and Recent Developments in Tender Officers and Insider Trading," CRS Report 87-590A (April 24, 1987).

[32] 15 U.S.C. sec. 78n(a).

[33] See Aranow & Einhorn, Proxy Contests for Corporate Control (2d ed. 1968).

The Williams Act consists principally of sections 13(d) and (e)[35] and 14(d), (e), and (f)[36] of the Securities Exchange Act of 1934.[37] Under subsections (d) and (e) of section 13, any person who acquires ownership of more than 5% of the securities of a corporation registered with the Securities and Exchange Commission must file public disclosures with the Commission within ten days after reaching this threshold. Subsections (d), (e), and (f) of section 14 deal specifically with tender offers, although the term "tender offer" or "takeover" is not defined anywhere in the Williams Act. Section 14(d) requires that all tender offer material concerning securities of a corporation registered with the SEC must be filed with the SEC and accompanied by the required disclosures before a tender offer is allowed to occur. Section 14(e) prohibits material misstatements, omissions, and fraudulent practices concerning tender offers, whether or not the company must report to the SEC under the '34 Act's reporting requirements. Section 14(f) provides for disclosure requirements concerning new directors.

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[34] P.L. 90-439, 82 Stat. 454, codified at 15 U.S.C. secs. 78m(d), (e) and n(d), (e), and (f).

[35] 15 U.S.C. sec 78m(d), (e).

[36] 15 U.S.C. sec. 78n(d), (e), and (f).

[37] 15 U.S.C. secs. 78a *et seq.*

In the past several years corporate takeovers and takeover attempts have again increased dramatically. Both bidders and target managements have become increasingly aggressive in attempting takeovers and in defending the targets, respectively, and such actions cost the target company a great deal of money, whether the takeover is successful or fails. After a takeover or a takeover attempt, a corporation often finds itself in a position of having to maximize short-term profits and of servicing a large debt. This situation forces corporations to cut back expenses, and one of the first kinds of cutbacks frequently is a reduction in research and development. Although this is not directly related to possible patent law problems concerning infrastructure research and development, many people claim that without research and development United States corporations will not be able to obtain patents for new products and technology in order to compete in the marketplaces at home and abroad. Therefore, this might be another situation making more difficult the obtaining of patents in the infrastructure area. Several bills have been introduced in this Congress to amend the Williams Act to correct this perceived problem.[38]

Conclusion

It cannot be stated with certainty that present federal patent laws deter investment in research and development concerning infrastructure technologies and processes. Such a conclusion could be made only after studies and hearings. However, it may be argued that such requirements as having eligible subject matter, novelty, and utility deter this investment. Further, it may also be argued that present takeover laws have caused a cutback in money available for research and development in infrastructure and other areas.

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[38] See, e.g., S. 1323 and H.R. 2172.

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October 20, 1987

The Honorable Daniel Patrick Moynihan
Chairman
Subcommittee on Water Resources,
Transportation, and Infrastructure
Committee on Environment and Public Works
U.S. Senate
Washington, DC 20510

Dear Senator Moynihan:

I congratulate you on your foresight in beginning a series of hearings on the nation's infrastructure needs. I am sure that your committee will hear much informed testimony about requirements for investment and reinvestment in public works improvements across the entire nation. As a concerned citizen of the State of New York and a civil engineer, I wish to offer some brief comments on a particular area of infrastructure technology based on many years of experience. I ask that this letter be included as part of your hearing record.

PROFESSIONAL BACKGROUND AND COMPANY EXPERIENCE

I am a registered Professional Engineer in the State of New York and Chairman of Mainlining Service, Inc., of Elma, New York. This company provides services in one specific area of the nation's infrastructure, namely the transmission and distribution piping system for delivering potable drinking water to our nation's citizens. Mainlining Service has been in the business of improving drinking water pipelines for 30 years. We provide services to rehabilitate the traditional cast iron pipelines employed by the vast majority of our water utilities. In the early 1930's, my father, Albert G. Perkins, developed the basic technology and accompanying equipment to centrifugally apply and trowel cement mortar to the interior walls of in-place water pipes. This cement lining technology has been utilized across the world to rehabilitate public utility and industrial water mains. Our company and others have successfully rehabilitated water mains all over the country, and a growing number of cities have instituted annual rehabilitation programs. Attachment A provides a selected list of the places where this cement lining technology (often referred to as the "Perkins Process") has been applied.

RELEVANCE FOR INFRASTRUCTURE POLICY

Local water distribution systems have a backlog of deferred needs. Water mains are generally underground and out of sight, but drinking water supply is a high priority component of the public infrastructure. When and if local governments come to the repair and rehabilitation of their drinking water supply systems, there are a number of alternative approaches. This committee should encourage a thorough analysis of those alternatives so that limited improvement funds, whether they be Federal, State, local, or even private, be applied toward the most cost effective improvements. Surely one basic issue is proper identification and consideration for low-cost alternatives to major new construction or replacement projects. As your committee considers the appropriate Federal role in supporting infrastructure rehabilitation, I urge that you accentuate the analysis of alternative, cost-effective processes to ensure the highest level of service improvement for any particular level of public works spending.

THE NEW CONSTRUCTION BIAS

Public works improvement projects often show a bias toward new system construction. The Congressional Budget Office report on Public Works Infrastructure: Policy Considerations for the 1980s identified this bias toward capital-intensive projects as a frequent feature of federal programs that causes problems in cost effectiveness. Of course there is a need for new systems and new capacity in many, many cases. There is also a need, and your committee can encourage this, for improvements in the decisionmaking processes for infrastructure programs and budgeting. You can and should ensure that a wide range of improvement options are eligible and receive consideration for any aid package. As the initial report of the National Council on Public Works Improvement concludes: "Technological innovation represents a potential means of meeting the nation's infrastructure requirements in a more efficient and less costly manner." Application of innovative and cost-saving technologies such as cement lining warrants your encouragement.

WATER MAIN REHABILITATION IS COST EFFECTIVE

Cast iron water mains have withstood the test of time. They have a very long life expectancy, they do not wear out, with very few exceptions. Well-maintained cast iron pipes are frequently over 100 years old. In fact, there is even a "Century Club" for in-service pipes over 100 years old and it has a large membership. The historical record shows that cast iron water mains provide an effective supply system for our citizens' drinking water. One survey of 100 large city water systems showed that about 90 percent of those water pipes were of cast iron. As unlined water mains age, internal mineral deposits known as "tubercules" form and impede the hydraulic carrying capacity of the system, and leakage can occur at joints and connections.

This pipeline rehabilitation process, which consists of cleaning and lining with cement mortar, offers many practical and economic advantages. This rehabilitation is less costly than pipe replacement, yet provides water flow characteristics comparable to new pipe. It can be applied with minimal interruption of water service to consumers and with substantially less surface trenching and disruption of streets. It substantially improves the serviceability of the existing pipeline system at a fraction of replacement cost. A published report on a water main rehabilitation effort in New Bedford, Massachusetts, shows cost savings of over 60 percent achieved by cement lining as compared to pipe replacement (see Attachment B). Cement mortar lining is a simple, proven procedure for cost-effective, in-place rehabilitation of water mains.

RECOMMENDATIONS FOR THE SUBCOMMITTEE

I submit three specific recommendations for the consideration of your subcommittee as you proceed to develop an improved policy toward the nation's infrastructure:

- **Recommendation 1.** Whatever your conclusions about the Federal role, local drinking water supply systems should receive attention as a critical component of any infrastructure improvement. All too often the underground water supply system has been out of sight and out of mind.
- **Recommendation 2.** The Committee on Environment and Public Works should mandate that cost-effective solutions be undertaken for all infrastructure improvements. Cost-effective alternatives such as the cement lining of water mains must be analyzed and given priority where demonstrably cost effective.
- **Recommendation 3.** Support for infrastructure improvement should be flexible enough to include rehabilitation and not be restricted to new construction solutions. In the water supply area, water pipe replacement should not dominate when proven, long-lived rehabilitation can be accomplished. Water main rehabilitation using the cement lining process represents a permanent capital improvement. We are convinced that this process can permanently protect pipelines for the transmission of the potable water under pressure. Yet, we know that this process does not always receive proper consideration in the improvement programs of many water utilities. Furthermore, these permanent improvements often experience difficulty in qualifying for inclusion in capital funding budgets.

I urge you, Mr. Chairman, and all members of your committee to consider advantages of this rehabilitation process for drinking water systems. I would be pleased to identify locations were we could demonstrate for the members and staff the effectiveness of this process, and I would be pleased to respond to any questions or provide further information as might be useful in your further deliberations. Finally, I wish you good luck in your mission in developing more effective infrastructure policies and support mechanisms for these critical aspects of our daily lives.

Sincerely yours,

A. G. Perkins

A.G. Perkins, P.E.

Attachments

ATTACHMENT A

PARTIAL LIST OF PLACES WHERE WATER MAINS HAVE BEEN REHABILITATED BY CLEANING AND CEMENT LINING

San Francisco, California
New Haven, Connecticut
Boston, Massachusetts
Rochester, New York
Buffalo, New York
Philadelphia, Pennsylvania
Portland, Maine
Auburn, Maine
Monroe County, New York
Hagerstown, Maryland
Fall River, Massachusetts
Kingston, New York
Troy, New York
Williamsport, Maryland
Bridgeport Hydraulic Company
Cleveland Ohio
Columbus, Georgia
East St. Louis, Illinois
Elmira, New York
Lebanon, Pennsylvania
Minneapolis, Minnesota
St. Paul, Minnesota
Winchester, Massachusetts
U.S. Army Ammo. Depot, Baraboo, Wisconsin
Titan III Complex, Cape Kennedy, Florida
Fort Chaffee, Arkansas
Fort Jackson, South Carolina
Portsmouth Naval Shipyard, Portsmouth, New Hampshire
Willard State Hospital Ovid, New York
Barksdale A.F.B., Shreveport, Louisiana
U.S. Naval Base, Groton, Connecticut
Stuttgart, West Germany
London, England
F.M.C., Buffalo, New York
Esso Standard Oil
Bethlehem Steel Corporation
Creole Oil, Amway Venezuela

ATTACHMENT B
COMPARATIVE COSTS AND NET SAVINGS FROM REHABILITATION BY CEMENT LINING VERSUS REPLACEMENT WITH NEW WATER MAINS
NEW BEDFORD, MASSACHUSETTS, 1975-1982

YEAR	AMOUNT OF PIPE (feet)	CLEANING AND LINING COST	ESTIMATED NEW MAIN COST	SAVINGS
1975	48,960	$232,085	$1,308,000	$1,075,915
1976	18,000	177,458	447,000	269,542
1977	41,195	381,707	1,143,000	761,293
1978	38,340	442,106	1,084,000	641,894
1979	19,600	427,294	643,000	215,706
1980	19,000	354,609	710,000	355,391
1981	16,100	238,170	842,000	603,830
1982	8,970	182,500	495,000	312,500
Totals	**210,615**	**$2,435,929**	**$6,672,000**	**$4,236,071**

Source: Robert Cuttone, P.E., "Cleaning and Lining Old Water Mains Saves Millions for Massachusetts," Public Works, March 1983, page 71.

NATIONAL INFRASTRUCTURE ISSUES

WEDNESDAY, NOVEMBER 4, 1987

U.S. Senate,
Committee on Environment and Public Works,
Subcommittee on Water Resources, Transportation,
and Infrastructure,
Washington, DC.

The subcommittee met, pursuant to notice, at 10:10 a.m., in room 406, Dirksen Senate Office Building, Hon. Daniel Patrick Moynihan (chairman of the subcommittee) presiding.

Present: Senators Moynihan, Stafford, Chafee, Symms, Durenberger, Pressler, Burdick, Mitchell, Mikulski, and Graham.

OPENING STATEMENT OF HON. DANIEL PATRICK MOYNIHAN, U.S. SENATOR FROM THE STATE OF NEW YORK

Senator **Moynihan**. A very good morning to our guests and our distinguished witnesses. The chairman of the subcommittee would ask to be forgiven: a vote was called suddenly and we're a minute behind here.

This is now the fourth in the series of our hearings on infrastructure which began so auspiciously when the Speaker of the House, for the first time in history—almost two centuries—came to the Senate to address a subcommittee.

We've been hearing from the professions and economists, and now we're going to hear today from people who have done it. I welcome you, sir. But first I'd like to ask if the chairman of the full committee would like to say something.

Senator **Burdick**. Yes, I would.

Senator **Moynihan**. Please do.

OPENING STATEMENT OF HON. QUENTIN N. BURDICK, U.S. SENATOR FROM THE STATE OF NORTH DAKOTA

Senator **Burdick**. Good morning. Welcome to the fourth in a series of infrastructure hearings being conducted by this subcommittee.

I'm very pleased that we'll be hearing today about the experience of States and local governments in meeting their public works development and redevelopment needs.

It is indeed a great pleasure to have the Governor of Maryland testify on infrastructure before this committee. He's one of the most accomplished experts in the area. I remember his excellent testimony on this subject in 1983 while he was still mayor of Baltimore.

We'll hear from other distinguished elected officials today: a mayor, county commissioner, state legislator. In addition, testimony will be given by some of the practitioners in the field who work on a daily basis on public works: planning, research, technical assistance, finance, and other nuts and bolts infrastructure matters.

Today's witnesses will speak from several different professional perspectives, and they have come from all parts of the country. We will hear from the East, the South, the Midwest, the Northwest, urban areas, and more rural areas.

I look forward to hearing from our witnesses, and I hope that today's diverse representation and bipartisan spirit foretells successes to come as we work together to resolve our infrastructure problems.

Senator MOYNIHAN. Thank you, Mr. Chairman. Our Chairman Emeritus.

OPENING STATEMENT OF HON. ROBERT T. STAFFORD, U.S. SENATOR FROM THE STATE OF VERMONT

Senator STAFFORD. Thank you very much, Mr. Chairman. I congratulate you on continuing these hearings. I think they're very valuable for us, and, like Chairman Burdick, I remember very well when the Governor of Maryland was the mayor of Baltimore and came here as a witness at that time. I've had some chances to visit Baltimore since, and I appreciate the progress that occurred in the city while you were the mayor, Mr. Governor. I'm glad to join in this welcome to you.

I will just say that I'm intrigued with the fact that Doctor Katherine Skelton of Cornell University is on the third panel. Having read the material she sent down here I'll be interested to hear what she has to say because I have a daughter and a son-in-law both on the faculty of Cornell, also, and maybe I should talk with them for a minute after these hearings are over.

Thank you, Mr. Chairman.

Senator MOYNIHAN. Senator Mitchell?

Senator MITCHELL. Thank you, Mr. Chairman.

I have a statement that I'd ask be placed in the record.

Senator MOYNIHAN. Please.

OPENING STATEMENT OF HON. GEORGE J. MITCHELL, U.S. SENATOR FROM THE STATE OF MAINE

Senator MITCHELL. I merely echo the sentiments expressed by our distinguished chairman commending you for these hearings, and also in welcoming the Governor. There is no better example in the Nation of a dynamic rebirth of a city than Baltimore under his leadership, and Maryland is now enjoying the benefit of that leadership as a State. You've done a great job, Governor, with Baltimore, and we look forward to hearing from you on how you did it and what role Federal programs played in it so that we can perhaps extend that opportunity to other municipalities around the country much in need of that. We congratulate you for your record, and we look forward very much to hearing from you.

[Senator Mitchell's written statement follows:]

OPENING STATEMENT OF HON. GEORGE J. MITCHELL, U.S. SENATOR FROM THE STATE OF MAINE

Mr. Chairman: I am pleased at the continuing progress we are making in developing capital strategies for the future as this series of infrastructure hearings continues. Today's testimony is among the most important, for we have much to learn from innovative programs developed by states and local levels of government.

The problems we face in financing the nation's infrastructure needs in the future are complex. It is clear that we need to develop a plan that will allow for the steady maintenance of our roads and bridges. We need also to develop a plan in which we will foster innovative technology so that plans developed today, will adequately meet the needs of tomorrow.

It is difficult to achieve these objectives in today's era of fiscal restraint. And, deciding where and how to spend our nation's limited resources is continually the subject of long debate with little consensus.

We have made substantial infrastructure improvements in the last decade with enactment of the Clean Water Act, the 1982 & 1987 Highway and Mass Transit bills, the Water Resources Act, and other legislation designed to set standards and offer federal funds to States and communities. But, few would say our role is over, our job is complete.

To the contrary, we have merely set the stage for future action. As these hearings continue, we hope to develop a capital plan, which both addresses economic and human development. Viewing our nation's infrastructure as a system, we cannot afford to shortchange investment, for that only can result in foregone productivity.

While we are heading into a high-technology era, it would be a mistake to ignore the "human factor". By this, I mean that we need to invest in programs that will offer individuals the education necessary to acquire the skills and knowledge necessary to develop innovative technology. Therefore, education is as important to the future of our nation's infrastructure as are federal funds to finance specific projects.

Second, we need to ensure that a system to adequately maintain and improve our nation's roads and bridges is developed. For it makes little sense to allow the progress we have made to date to idly wear away. And, third, we need to look toward tomorrow to ensure that we are making America the best that it can be, so that the movement of people and goods is not impaired by a system in need of repair or a system ill-suited for the population in the decades to come.

Mr. Chairman, I look forward to the testimony the Committee will receive today, for infrastructure planning is a partnership effort and cannot be achieved without the states.

Senator MOYNIHAN. And now, especially on this occasion, Senator Mikulski.

OPENING STATEMENT OF HON. BARBARA A. MIKULSKI, U.S. SENATOR FROM THE STATE OF MARYLAND

Senator MIKULSKI. Thank you very much, Mr. Chairman.

This is a very special day for Governor Schaefer and I because it was 16 years ago today that he was elected the mayor of Baltimore and I was elected to the Baltimore City Council, and thus began, I think, one of the most important eras in Baltimore's history.

There is a great deal of irony in this particular hearing because I got into politics fighting a highway coming through my neighborhood, and the Governor was for it. But we came up with a route change that helped create the Baltimore renaissance.

But what we absolutely agreed on then, and we agree on now, is that the Federal Government needs to make public investments to create private sector jobs. I want to congratulate this committee for doing things like the Highway Bill and the Water Resource Bill that have done that.

As we know, there is a lot that needs to be done to upgrade and improve our infrastructure. Few people know more about upgrading the infrastructures at all levels than our first witness today, Governor William Donald Schaefer.

Governor Schaefer has worked long and hard in both local and State government. He's established a record that the whole Nation knows and envies for developing a city. But what Governor Schaefer knows is that the key to government spending is to look at it as an investment strategy, and that also key to that strategy is to make sure that there are partnerships between all levels of government and the public and private sector.

As we face Gramm-Rudman limits, we need to know how to get the most return on Federal dollars. Governor Schaefer has been there in the trenches on these issues, he has a unique expertise.

I'm happy to welcome my friend and Governor to the committee, Governor Schaefer.

Senator MOYNIHAN. We're happy to know how it all began.

Senator Sarbanes, you're very courteous to come to our committee and introduce your Governor.

STATEMENT OF HON. PAUL S. SARBANES, U.S. SENATOR FROM THE STATE OF MARYLAND

Senator SARBANES. Well, chairmen of full committee, subcommittee, and emeritus, who I see outnumber the members, I'm pleased to have this chance to say a word about Governor Schaefer.

Before I do that, let me make two points about the committee's work. As a chairman of the Joint Economic Committee we have issued some reports in the course of this Congress that have underscored the necessity—in fact, the vital necessity—of a proper investment in infrastructure if we are to compete effectively in the international arena. It is clear that other nations are making wise and prudent investments in infrastructure, and it's essential to our future economic strength and, therefore, I very strongly welcome, Mr. Chairman, the hearings which you have been holding.

I would also point out that the two major contributions to addressing this problem have been the initiatives that have come from this committee in this Congress: the Highway Bill and the Clean Water Act. On behalf of all the membership we express our appreciation to you for the leadership in that effort, and the fact that those programs, which are essential in two vital areas for enhancing our Nation's infrastructure, are now in place.

I think the committee is fortunate, in a sense, to have Governor Schaefer before it today. He's experienced and wise in these problems. He was a member of the Baltimore City Council beginning in 1955, became its president in 1967, became mayor in 1971, served as mayor for slightly over 15 years until he took the oath of office as our Governor last January.

His leadership in the renaissance of Baltimore, and now in the renaissance of Maryland, is well known to all of you. He has always recognized the importance of the issue that you are addressing this morning. I think his perceptions, both in terms of theory and even more so in terms of practice, will be very helpful to the committee.

I'm pleased to have this opportunity to present the Governor to you.

Senator MOYNIHAN. You're very generous and thoughtful to come. I'll say this before you have to run off: one of the points we do make is that we did begin this Congress by reenacting the Clean Water Act and the Surface Transportation Highway Program, but those bills also end both those programs. They come to an end with the legislation we passed in the early part of the year, and so the question is: what do we do now?

Governor, as you have heard, we are most exceptionally pleased to have you here, and we look forward to your testimony, sir.

STATEMENT OF HON. WILLIAM DONALD SCHAEFER, GOVERNOR, STATE OF MARYLAND

Governor SCHAEFER. Well, thank you very much, Mr. Chairman. I appreciate it. If you will allow me a little latitude to wander around, I've got some charts to present.

All the kind things have been said. The reason I want that blank chart up there—I never really thought about it—the first chart should say, "There would have been no improvements to the City of Baltimore without the Federal Government." That was the first one that should have been there.

You know, all of us in public life wonder. We get bad press, we get good press, and sometimes people don't appreciate what we do. I say the success of the city was due to the Federal Government. I'll try to get to that a little later on.

Senator Mikulski, who is my very good friend, and Senator Sarbanes were a very important part of that. Barbara came into the city council opposing an expressway that I wanted to put through Fells Point. I learned a lesson there. First of all, she knew the road was right, but the place was wrong. So the important part was: would a mayor listen to the people, or would he try to jam that road right through an area where people didn't want it. Barbara said, "You are wrong." And I said, "I am right." She won.

Senator MOYNIHAN. May I say, sir, that has happened here on Capitol Hill.

Governor SCHAEFER. Well, if you'll allow me, I really appreciate the opportunity. I was here in 1983, and at that time I came to testify before you to tell you some of the things that were going to happen to cities, some of the good things that were going to happen to the cities, some of the problems that cities would face if the rules were changed, if the legislation was changed. Just about everything that I said, I think, almost all of it did come true.

The first thing I said was that "in a lot of the programs that we have we've gone a little bit too far. We should not have as much as we have." That was sort of an eye-opener. Well, what do you mean? I said, "Well, we were getting too much. Maybe we should readjust and think about doing some things on our own."

You told me, "We'll help you, but you've got to do some things on your own." We did. We changed a lot of our philosophy, and when the rules were made we abided by the rules.

People have said, "Well, now that you're a Governor, have you changed? Has your philosophy changed?" The answer is, "No." The philosophy is still the same. We're doing it in a different arena, we're doing it on a State level.

One of the problems that you all face—I think you face it every day—the traffic in this area. Years ago there were some plans to build highways in the area, and it met with a lot of resistance. As a result of that, they were not built. Movement plans were not fulfilled. As a result of that, this great area in Montgomery and Prince George's County and the Washington area is where we're now spending $1 billion in Prince George and Montgomery County on roads over the next five years. Are they important? Yes, sir. Absolutely. Without the infrastructure Montgomery County and Prince George's County would strangle themselves to death in traffic. They know that now, and we're moving on that. That money is being spent. So we're a very, very strong believer in infrastructure.

When I was mayor I used to go around and listen to people, as I said, like Barbara and others. I asked them what they needed. What do you want to do? How can we do it better? After listening we began to understand what infrastructure was all about. I didn't even know what the word meant. What was infrastructure?

I think the first thing we tried to do was to find out what is infrastructure. There are two kinds. I found out one was physical, and one was human.

Physical infrastructure is the roads and bridges, rail and ports, water and sewer, and mass transit.

There is also human infrastructure: skilled and educated people, schools and colleges, arts and culture, cooperation between the public and private sectors.

We found one other thing: we had to create a climate for investment. If you have all this infrastructure you have to have an ultimate goal. The goal, of course, was jobs. We learned a long time ago that if you have a man and he has a job you have less problems because he has the dignity to take care of his family. So jobs became a very, very important element.

Self-sufficiency became important.

A more competitive Maryland—if you can't compete your state goes down the drain, so you must compete. So we had a more competitive Maryland and United States of America.

I just left a group of businessmen in Prince George's County and talked about our competition with foreign investment. Are we in the international market? Is Maryland in the international market? Right now we're not. Maryland government is not. We're changing that.

Then the quality of life. The basis for all of the things that we're interested in.

Now, let me give you some case studies, if I may. A case study about Baltimore—ask about Baltimore—again I repeat that the investment in Baltimore, the progress of Baltimore could not have been done without one thing right off the top: Federal Government in a partnership.

Why is the City of Baltimore great? You know, if you'd been there 15 years ago, that Baltimore wasn't. It was a place that you drove around. You didn't go there. There wasn't any inner harbor there. Neighborhoods were not strong. They had one thing. They had a great group of people who wanted to improve the city, but they needed help. They absolutely had to have it.

What we were able to do: first, we went to our governor and said we need a partnership—that word "partnership" goes all through every thing I do. Without a partnership of the business community—as Barbara knows—the Federal Government, the state government, and the local government we wouldn't make it. But we said we need a partnership.

And then the people would say, "Well, that's crazy. It's government's responsibility. It's the Federal Government's responsibility. It's the state government's responsibility. It's local government." And we said, "No it isn't. It's all. The Federal Government, the local government, the state government." Then we added one element: the business community. We said, "You've got to be a part of this. You have to come up with part of the funds." And they did.

The last one, and the most important part, is getting the people enthusiastic about infrastructure, get the people enthusiastic about a city. We did. That's why Baltimore started on its way.

What did we do? We went to the government. We went to the Federal Government, State government, and local government and said this: we need some help.

You passed the Roads Bill, and you said something very important, Senator. The bill will run out. The need for roads will not run out. The need for expressways will not run out. The need for mass transit will not run out. The need for trains will not run out. They're all there. As roads get older, there must be improvements to roads. There must be improvements to bridges. Little bitty bridges that carry two lanes of traffic now have to be widened and additional bridges have to be built.

You can say, "Well, the environmentalists are going to be against all this." No, they're not. They're going to understand that if our country is to be strong we've got to be able to move people and goods in and out.

So we went to the Federal Government and we said we need to build some roads over here. Where would you be if you didn't start on that roads program? Where would Maryland be if you hadn't passed that Roads Bill, that Expressway Bill, the local roads on the Eastern Shore?

The second thing we said was that we had to upgrade the port. If we're going to compete on the international market we've got to have a better port for exports—and I underline that word "exports"—and imports.

We've got to do something with our airport. We've got to be competitive. If the Baltimore Washington International Airport just stayed there and just went down the drain there would have been no airport.

The Federal Government helped us, again, with a trained work force, which is most important. To meet manpower and employer needs—you all know, you've heard it, and I've heard it. I remember over here in Congress that I heard by the year 2000 there will be a job for everyone if they are trained for the job. It is up to all of us to train people for those jobs—not one segment, every segment.

We also offered arts and culture to improve the quality of life.

Again, we brought in the private sector. Why would they do anything if we didn't do anything? The business community and the private sector then said, "Okay, you do what you have to do, and we'll start investing in new plants and basic industry." They're not going to put any money in an area where there are no roads to get in. They're not going to put any money where there's no transportation. They're not going to put any money where the Chesapeake Bay is going down the drain with no hope. They're not going to put any money in without rail access.

So they started to invest in a new service industry, so banking and insurance headquarters moved in. In research and development this area is one of the greatest areas for economic, high-tech industry in the United States.

Let me just digress one minute. I went to Japan, and I said, "Do you know anything about Maryland?" And they said, "No. We know where Washington is." And I said, "I want to tell you Washington is in Maryland." Then they knew where Maryland was.

I also said something else. I said, "Do you know we've got the best high-tech area in the country?" And they said, "No you don't. That's Silicon Valley." I said, "Come to Montgomery County and see the Silicon Valley that we have." High-tech.

Research and development have created 20,000 new jobs in 10 years, and we've increased the tax base by nine percent. They say, "Nine percent tax base?" The tax base has increased by nine percent, but the expenses in taking care of older city has increased by 13 percent, so that's why older cities like Baltimore continually need help from the Federal, state, and local governments.

The second one, case study number two: Chesapeake Bay. What happened to the Chesapeake Bay? We all sat, we all watched the fish die, we all saw the area eroded, we saw all the problems, we saw years of neglect. Nobody knew it was neglect. Boats came along, and instead of putting whatever it is into holding tanks they put it right into the water. Everybody was throwing trash into there—just throw something, it didn't make any difference. Years of neglect.

And then all of a sudden the expense. You can't find land on the shores. You can't buy any land; too expensive. Everyone was building, and off comes all this fertilizer into the bay, silt into the bay, until it's hurt.

Boating and recreation: did you ever see so many boats in your life? If you go to Annapolis you could walk right across the water on the boats.

Over-fishing: everybody said, "We're going to catch rockfish like wild." Remember the days when everyone would catch fish and throw them on the docks and let them rot? We don't do that any more, but it is going to take some time to get the rockfish back.

Two things are going on, one in the private sector where they're raising little rockfish—there's a power plant in Prince George's County putting them through a process—300,000 of them—being put back into the bay. Eighty percent of the 300,000 will survive.

There is a hybrid over on the Eastern Shore and big ponds over there. And pollution, nobody knew what pollution was. I used to say to people, "You're messing up the bay." The man said, "I never messed up the bay." And I said, "Yes, you did. Did you ever put any oil in your alley and let it go down the sewer?" He said, "Yes." I said, "You're destroying the bay."

So what we're trying to do is get everyone to understand—everyone—everyone must help.

What's happening?

The oyster industry: disease, MSX. We don't know what it is. We don't know how to handle it yet, but we're going to work and are working on it.

Ban on rockfish: nobody can catch a rockfish. The other day I was over on the Eastern Shore and they fried up some hybrid, and I ate that new hybrid fish. A man called me up right away and said, "How come the Governor can eat rockfish and I can't?" I said, "What rockfish? They were hybrid." Well, he didn't understand that.

Ban on development: we've got one house on 20 acres, and that's a big deterrent to development. We're going to go out and look at that and see if we can do it—sort of keep that development, make sure that shoreline is kept up, to prevent the loss of our greatest natural resource, the Chesapeake Bay.

Now, what did you all do? You recognized this. What we need is a cooperation of Maryland, Virginia, Pennsylvania, Washington, and Delaware. A long-term commitment by the Federal Government—and you did this. You've done this for the next four years. I think the Clean Water Act goes for four years, so it takes seven years, eight years, so it takes your assuring me, as the governor, that the Federal Government is going to help us clean up that bay. If you pull out and our people are left with no help from the Federal Government, we'll do it—don't get me wrong, we'll do it—but we'll do it much slower. You can help us on this Chesapeake Bay.

Let's take study number two, Kelly Springfield. Now, this is where we go into a thing called "small community." Kelly Springfield—there's an area out in Western Maryland called Cumberland. It's a great area out there; really a fine, fine area. They depended on one industry called Kelly Springfield. Kelly Springfield suddenly decided, because they had some problems, they're going to leave the area. When they left the area and the plant closed 1,100 workers out of work, and corporate headquarters said they were going to move out, too.

There are two things we can do about it. One is say, "Okay, so long. Nice to see you. Good-bye." The second was, "How can we keep part of that industry here? What can we do? What can we do?" I remember it as if it were today: the president of the corporation said, "I'll give you a chance. We'll keep some of it there if you do something and come up with a plan."

What did they want? First of all they wanted us to all join together—labor, management, city, county, and state—all in one. Second of all, they wanted a positive attitude. They didn't want us to say, "Oh, gee. The world's ended." We did that. The third thing they wanted was to build new headquarters.

Now, how are you going to do it? First of all we had to have some money. The State came up with some money, and the Federal Government came up with some money, and we built a new headquarters, which, in reality, is infrastructure.

We said to the community college out there that we wanted them to work with us to train the work force. The community college said, "That's a good idea. We want to do it." Again, we got help from Federal funds.

State and Federals expedite national freeway: they said, "You've got to be able to get our goods out fast." We said to them, "Okay, we'll go to the Federal Government and talk to them and see if they'll expedite the infrastructure of that national freeway." They said, "We know it's important." And they did. They did that.

State improves airport: a little airport out there. Nobody bothers with the airport. You come in, you land on the runway from here to there, and the guy says, "Gee, I'll get killed if you keep on coming." Move the mountains back. Do whatever is necessary to do it. Do whatever you've got to do, but do something.

Anyway, they——

Senator MOYNIHAN. They moved the mountain back?

Governor SCHAEFER. They moved the whole thing.

What I'm trying to say is: that company now is going to put their headquarters there. The headquarters is going to stay there because we—you, me, local business-people—all worked together, and the Federal Government. Without you saying you'd back us up on some of the things it wouldn't have happened. That is what is known as "infrastructure." That cooperation of the Federal Government must be there.

Lastly, then I'll stop: Boonsboro, 4,000 people. This is where infrastructure on a smaller level is so important. These 4,000 people have a broken reservoir out there. It costs $135,000 to rebuild it. The 4,000 people cannot pay $135,000 to repair the reservoir. They must go some place to do something. Where are they going to go? They came to us. We said, first of all, that it's too much for the town to do. They can't borrow the money. They don't have the ability to borrow the money. They came to us.

This is where the state can do it. They should do it. If they can do it they should do it, and we did it with the state's new Community Infrastructure Program. We were able to fund this $135,000 by selling state bonds, and they're going to pay part of the money back.

So we said we can do some of the things without going to the Federal Government, and we're going to do it. We did this in Boonsboro, and now they're going to have their new reservoir built.

All right, now, what do I face? What do I face? What all governors face, what a mayor faces, what all of us have to worry about. First of all, I don't have to tell you about highways being congested. There are $6 billion going to be spent on highways in Maryland in the next five years—$6 billion.

The Chesapeake Bay: we've know that we've got to rescue that.

Failing water and sewer systems: I was over in Aberdeen yesterday. They were wise. They built a sewer system that's two-thirds larger than their needs are right now, but then they were able to use part of it for industrial waste. They were able to use it right now, but they're getting ready for the future. Water systems and sewer systems in Baltimore are as old as the hills, and somehow, somewhere along the line, we've got to find a way to help those systems.

Schools and colleges are in need of funds. The University of Maryland is a great university, and our concentration will be on making it an even greater university, along with our private schools and our other colleges. Some of the buildings over there need some attention.

Growing number of unskilled teenagers: there's a key right there. How are we going to get the teenagers to take the training to be able to get the jobs?

Insufficient mass transit: you've done a great job on mass transit over in this area over here. I wonder what would have happened to Montgomery County, Washington, DC and Prince George's County if you all hadn't passed the Mass Transit Bill. You wouldn't be able to get in here. Mass transit is absolutely essential if you're going to move forward.

That railroad line—you're interested in railroads—a railroad line from Boston all the way down to Washington ought to be built.

When I was over in Japan a couple of months ago they had just agreed to build their second bullet train, and we turned down the building of a train between San Francisco and Los Angeles. The Bullet train moves a tremendous amount of people. We have to watch mass transit.

A distant and aging Appalachian region: worries we've got with that. We're doing that.

All right. Now, how do you solve all these? Everybody has got all these problems. How do you solve them? First of all, you've got to say to all the towns and the cities, "The Federal Government's not going to do it all. You guys have got to do something yourself. You've got to sit down and figure out how you're going to raise some money."

Towns and cities—we've got to get private business. We've just spent a lot of time with private business talking about how we all can work together. Then we've got to get the involvement of people. Then we've got to get you all to remember how important you are. Sometimes you forget how important you are. The Federal Government is absolutely important to programs that help people and create a climate for private investment. If the government can stimulate the private sector to make that investment we move forward. This is some of the problems that we have.

This is the last chart. It's sort of a negative chart. I don't like it, but it's there. How do we create this investment? There was a tremendous amount of Federal grants and loan programs. They were there. Some of them were good, some of them were a little bit too much, some of them could have been cut back, and they were.

EDA was an important one. Wastewater construction was an important one. General revenue sharing is sort of gone. CETA and JTPA are very important.

State and municipal tax exempt bonds—this is one of the ones that is critical with the problems that we have—curtailed by the 1986 Federal Tax law. I know it's a problem with you, and to us. It's burdensome regulations, restrictions on use, and limits on amounts that we can use.

Local revenues: the cost of basic, municipal services has increased by 210 percent in the last 20 years.

What we have to do is see what the problems are. Here's the last one. The bottom line. First, we can't ignore the problems. I know you can sit and say, "Gee, you know, Governor, we like you. You're a nice guy, and all that sort of stuff. You've got two great senators and they're working together with you, but you do it." If you say that to me, I fall through the floor. I can't make it. I've got to have the Federal Government with us as a partnership. You can't ignore the problems of a failing infrastructure. You just can't ignore it.

Second, time is not on our side. People kid me about this, "Let's get to it now." If you can do it six months, do it in three. If you can do it in a year, do it in six months. Do it now. Right now. You've got to move now. You can't wait. It's not on our side.

Cities and states cannot fill the gap created by massive Federal cutbacks. We can with some. If you would stop every program right now I wouldn't fold up and quit. We'd sit down with Barbara and Paul and the rest of them and say, "How are we going to do it." We'd just have to. It would be much more difficult. We can do some things, but we need the Federal Government.

The last thing: we need the Federal Government to be a partner with the state and with the local government and the business community.

The fact that you're having hearings on infrastructure is so important, and I just commend you for it.

That's it.

Senator MOYNIHAN. Wow. The committee will stand in recess for five minutes while we catch our breath. I'm kidding.

Governor, that was extraordinary. You've tossed ideas at us like confetti.

Can I make two points? One is that we are very much interested in that rail question you mentioned, and that we would like to move into the next century, not back into the last one. It is possible to really get an old railroad train and make it work better than it ever has, but you're making an early 19th century machine work better than it ever has. What we're thinking about is getting magnetic levitation—a new form of transportation, the first since the airplane flew in 1903—and think in terms of 350 mile an hour runs. Baltimore to Washington would be 12 minutes, maximum. The science is all done, it's just the engineering.

The second thing—and perhaps you could expand on it— but I just want to tell you that we are very much moving towards this question of bonding authority, of lending authority. We did cut back hard in 1986.

I see you have a Maryland infrastructure program. Perhaps you could describe that to us.

Governor SCHAEFER. Well, when the Federal Government cut back on us we knew that the smaller localities just couldn't do it themselves, so we set a certain sum aside and we lend the money at a very low interest rate to improve their infrastructure. The reason I brought up Boonsboro is that that's a perfect example of how we lend some money.

We're going to set up a number of things, we hope. I don't know whether the state legislature is going to allow us. We're going to set aside $20 million for what we call an action fund, so if we need some money for infrastructure we'll have some money. We'll have some money that we can lend to a business in order to expand. That's the way we're going to handle that.

But, again, the primary objective is: the Federal Government, on the bonding—I know it takes a lot of money out of the Treasury, but for us to be able to have tax-free bonds is a great incentive to the business community to purchase the bond and get us the money that's necessary.

Senator MOYNIHAN. We're going to have to address that as a national problem.

My governor, your colleague, Governor Cuomo, is in town, and I have to slip over to the majority leader's office to see him. Senator Mikulski will chair the committee for the moment, and I will be back.

Senator MIKULSKI. Senator Burdick, do you have some questions for Governor Schaefer?

Senator BURDICK. I appreciate his contribution this morning. I think the best word is "absolutely thrilling" to hear of your programs. You've done a great job.

Senator MIKULSKI. Senator Stafford?

Senator STAFFORD. Thank you, Madam Chairman. I must say, Governor, I'm as much impressed now as I was in 1983 when you were with us before.

One thought occurs to me that maybe you could comment on, and that is the fact that generally, public officials get credit for building new things, and I wonder how we could establish the fact that government officials in a partnership, as you suggest—local, State, and national—could get some credit for keeping the infrastructure we have now: keeping the highways up, keeping the buildings up, sidewalks, sewers, and so on. Usually we don't get much credit for doing that. It's building new things that attract public attention.

Governor SCHAEFER. Well, the answer to that, I think, Senator Mikulski, down in the Fells Point area—that area was allowed to deteriorate—sidewalks—everything that you're saying is true—trees—everything was out. We spent a lot of money on catch-up. I think the easiest example I can give you is the city hall in the City of Baltimore. I sat many, many times in the city hall when they were talking about putting some maintenance money aside and always knocked it out. Finally, when the building started to fall in we then started to see that we'd made a mistake. We went out and got a bond issue for $10 million, redid the whole city hall. We kept the exterior and most of the historical parts.

One thing that I did do—and I hope it will be continued, and I know it will—we set aside $450,000 a year to maintain the building. Instead of that $20 million that we eventually spend on rehabilitation of the building—paint, problems, water leakage, all the rest of these problems—we're able to maintain. The same way with the preventative maintenance program for all cities. Now, that's hard. It's hard because there is such pressure to build new, but we've worked hard on preservation of what we have. You're absolutely right.

Senator STAFFORD. Thank you, sir. Thank you, Madam Chairman.

Senator MIKULSKI. Senator Mitchell?

Senator MITCHELL. I have no questions. I thank you very much, Governor, for your very persuasive testimony. We're going to do the best we can to meet the need that you described in your closing words. We need you as a partner. We intend to fulfill our obligation in that regard.

Governor SCHAEFER. Thank you.

Senator MITCHELL. Thank you.

Senator MIKULSKI. Senator Chafee?

Senator CHAFEE. Thank you, Madam Chairman.

I want to say how nice it is to see the former mayor, now governor, back again. He's been before this committee many times. He's extremely eloquent and vigorous and persuasive. I don't know too much about Maryland government except what I read in the paper, and I read a lot about Governor Schaefer. Keep up the fine work. We look forward to seeing you back again.

Governor SCHAEFER. Thank you, Senator. I appreciate that.

Senator MIKULSKI. Governor, we want to thank you for coming today, and want to congratulate you on the way you showed what the infrastructure needs are and the mix between physical infrastructure and human infrastructure, that whether it was saving the Kelly Springfield or helping Cumberland or revitalizing Baltimore we need to invest in people as well as in buildings and highways, which we think is absolutely important.

One question that I have, really in behalf of the committee, is this: I know that whether you're a Governor or you're a mayor you need flexibility and ability to respond to local need. The need varies from neighborhood to a city, from a small town to an entire county, and at the same time, you and local government know what those needs are. We can't anticipate how to do that. My question is: how would you suggest we make the Federal Government more of an effective partner and provide State and local flexibility while we provide Federal resources?

Governor SCHAEFER. The old adage is, "Where the money rests is absolute control." I don't believe in that. I believe that there must be general guidelines in how you spend the money and how you administer the money.

One of the things that we tried to do—and we continue to ask—I think I testified to this the last time I was here—let me have the money, let me make some decisions, and then come back and see if I spent it properly. One of the things I don't think the Federal Government does: I don't think you go down on the local level and see how the money is being administered.

I have no objection—I don't feel that you're trying to tell me what to do. I think you're trying to say to me, "You're not spending the money in the right way," and we'd like some help on how to do it.

I would say flexibility, as broad as you can, on the bills, with some flexibility on the part of local government, and then to have someone check on how we're using the money.

One of the most important things is how you use it. For instance, one time we did finance a McDonald's, and we got a lot of criticism for financing a McDonald's. But the McDonald's in that area wouldn't have been built. The whole area depended on one building being built. We could explain that, and as soon as we explained it it was fine.

It was the same way out in Western Maryland. We're going to do some things in the area of recreation. From that bond money being spent in Western Maryland on some recreation, hotels and industries are going to be created in that area. Whole new industries are going to be created there.

You were in the City Council with me. You know if you have it so restrictive you can't breath, you can't move. You need a little bit of flexibility.

But you also ought to watch what I'm doing. You've got to watch what I'm doing and see if I'm doing the intent of the bill, and that I have no problems with at all.

Senator **Mikulski**. Well, thank you very much, Mr. Governor. I think this wraps up our questions here for you.

We're now going to turn to local government and ask the Honorable Mayor Michael Traficante of Cranston, Rhode Island, to come; Gerald Thompson of the National Association of Counties, and the Commissioner from Broward County in Florida; and the Honorable Dean Conley, the National Conference on State Legislatures. Will all of you please come up?

We welcome the panel.

I know that Senator Chafee shares the same hometown pride in one of his mayors as we do in ours. Senator Chafee, did you want to introduce Mayor Traficante.

Senator **Chafee**. Thank you very much, Madam Chairman.

It is my great pleasure to introduce to the committee——

Senator **Mikulski**. If the enthusiastic observers could be just a little quieter while we hear from the senator from Rhode Island and then the mayor.

Senator **Chafee**. Thank you, Madam Chairman.

It is my great pleasure to introduce to the committee Mayor Michael Traficante of Cranston Rhode Island. Cranston is our third-largest city. It is a thriving city. It has everything I think the populous would want. There is good industry there. Just yesterday they approved a $2 million bond issue for open spaces to acquire additional lands for parks and recreational areas.

Mayor Traficante has been an innovative leader, not just in his city, but in the State, as a whole. He is president of the Rhode Island League of Cities and Towns. He speaks with considerable authority, and I was so glad that he has taken the trouble to come down and be with us today. He can give us some excellent insights into how to run a city and run it well.

Thank you.

Senator **Mikulski**. Mr. Mayor, we welcome you, and we ask you to proceed with your testimony before the committee.

STATEMENT OF HON. MICHAEL A. TRAFICANTE, MAYOR, CITY OF CRANSTON, RI, ACCOMPANIED BY KATHLEEN A. CEVOLI, DIRECTOR OF ECONOMIC DEVELOPMENT; AND KEVIN M. FLYNN, CITY PLANNER

Mayor **Traficante**. Thank you, Madam Chairman. Madam Chairman, I'm also joined today by my Economic Development Director, Ms. Kathy Cevoli to my left, and also my City Planner sitting behind me, Mr. Kevin Flynn.

We do appreciate the opportunity to address this distinguished Committee on Infrastructure, and, of course, the creation of a very healthy business climate in my city in partnership with the Federal Government.

I do have a prepared text which I'd like to read into the record, Madam Chairman, with your permission.

Senator **Mikulski**. Without objection, so ordered.

Mayor **Traficante**. Madam Chairman and distinguished committee members, Cranston, Rhode Island, is a community of 76,000 people whose predominant source of revenue is the local property tax, 63 percent to be exact.

We'd like to illustrate for you just a few examples of the great success my city has experienced in utilizing a multitude of incentive financing options made up of public and private revenue sources.

In order to bring necessary infrastructure improvements, utilities, and road construction to the areas with potential for economic development or in need of revitalization, we utilized Federal programs such as our UDAG's, our EDA revolving loan monies, CDBG's, and our SBA loans. Together these resources have enabled communities like Cranston to revitalize our neighborhoods, to attract business, to create jobs, and to generate tax revenue that, in turn, funds the local services our taxpayers rightfully expect.

While it has been my priority to maintain a positive image of our business climate in the City of Cranston, local government—and I stress this—local government cannot do it alone. A continued commitment at the national level will assist cities and towns in expanding their tax bases to buffer against dwindling Federal resources.

One example of Cranston's creative use of available resources is the Roger Williams Foods project. If you'd like to refer to page 7 of my prepared text it will give you a breakdown of the financial infrastructure available there.

The company, one of New England's largest independent wholesalers, is constructing a new 160,000 square foot facility, creating 150 new jobs, and generating $250,000 in tax revenue for our city annually. Within 10 years they plan to expand to a 641,000 square foot facility with more than 600 jobs, and a yield of $700,000 in new taxes. To accomplish this important economic success, the city agreed to spend $400,000 to extend sewer lines to the new site, which will also service 45 additional acres of commercial and industrial property.

We assisted in securing $10 million in Rhode Island Industrial Revenue Bonds. We also utilized the projected income stream of two of our UDAG grants totalling $1.6 million. As a result, the company achieved a favorable interest rate which will facilitate long-range growth.

Our recycling of UDAG's is a first for my city and represents an innovative approach to economic development financing in the nation. We utilized a resource which would not be available for years to come to reap an immediate $10 million investment with a projected $29 million expansion.

Another example of combining resources to expand our tax base is the Howard Industrial Park in our city. If you'd like you can refer to page 4 of my prepared text for a breakdown of that particular project.

The Howard Industrial Park encompasses 35 companies, 2,800 employees, and represents $45 million in private investment. An additional $10 million capital investment is in the works for the Howard Expansion.

To make it happen we developed a comprehensive $3.5 million infrastructure package consisting of roads, sewers, and a sewer pumping station. In addition, businesses were assisted through the city's revolving loan monies, SVA loans, and state industrial revenue bonds financing.

The Howard Industrial Park today is Rhode Island's premier business address, generating $900,000 in taxes this particular year—over $4.5 million since 1977, and it continues to grow.

Infrastructure programs have also been used to provide quality of life benefits that exceed raw tax expansion. You can refer to page 11 of my prepared text for an explanation of that particular project.

In Cranston we are very proud of our neighborhood revitalization programs. Knightsville, Cranston's oldest settled area, has suffered from poor street conditions, inadequate sewer lines, and general neglect for years. The critical element of Knightsville's success was their ability to coordinate funding from a variety of sources simultaneously to recreate the entire infrastructure fabric of that particular neighborhood. These resources included community development block grants, Federal and state highway dollars, storefront improvement loans, and our own local funds.

Today the Federal Government's role in funding infrastructure improvements has diminished. We have looked within ourselves for other resources, mostly from the private development community. We have introduced substantial increases in sewer tie-in fees, we have negotiated with developers to donate property for recreation or to upgrade impacted highways, we have enacted a development impact fee to offset the effects of new residential development on the city's capital budget, we also expect tax increment financing to play a key role in the revitalization of a 77-acre former brewery.

These programs can be effective in a booming economy climate; however, during times of economic hardship, communities may not be able to negotiate private participation or defer much-needed tax revenue. As a mayor active in national issues, I recognize that sacrifices must be made at the local level to reduce our nation's deficit.

Cranston's experiences, I'm sure, have not been unique. Cities everywhere have benefited from these resources and these programs, and we've used them prudently in our area.

The information we have provided clearly illustrates the benefits of these programs at the local level, and the need for you and your colleagues to maintain a commitment to and a partnership with our nation's cities and towns.

Madam Chairman and distinguished members of the committee, I again thank you for the opportunity to share with you Cranston's success story.

I'd be glad to answer any questions you may have at this time.

Senator MIKULSKI. Well, thank you, Mr. Mayor, for that helicopter tour of Cranston and for your very crisp testimony.

Senator Stafford, do you have some questions of the witness?

Senator **Stafford**. I do not, at this point. I compliment the Mayor on a very good statement. I don't know, Madam Chairman, whether you're going to hear all three of the witnesses before questions or individually.

Senator **Mikulski**. Well, perhaps we'll go through the entire panel and focus on local needs.

Senator **Stafford**. I thought, Madam Chairman, that Mr. Thompson ought to have a chance to speak, because he can now refute the charges which apparently Governor Schaefer was leveling at him when he pointed at him during his testimony.

Senator **Mikulski**. We're going to hold Mr. Thompson, because I know now Senator Graham wants to be here.

We're going to turn to the Honorable Dean Conley from the National Conference of State Legislatures, who chairs the Ways and Means Committee in the Ohio House of Representatives. Mr. Conley, we're happy to hear from you.

STATEMENT OF HON. DEAN CONLEY, NATIONAL CONFERENCE OF STATE LEGISLATURES, AND CHAIRMAN, WAYS AND MEANS COMMITTEE, OHIO HOUSE OF REPRESENTATIVES

Mr. **Conley**. Thank you, Madam Chairperson, and members of the subcommittee.

I would like to thank you for the opportunity to appear before you today to discuss financing our nation's infrastructure needs. As chairman of the Ways and Means Committee in the Ohio House of Representatives, I am acutely aware of the shortfall in revenue to finance all infrastructure deficiencies that have been identified in Ohio.

However, I am here today testifying on behalf of the National Conference of State Legislatures. I currently serve as the NCSL Chairman of the Capital Budgeting and Finance Subcommittee. This subcommittee was formed around two years ago and charged with developing recommendations for strengthening legislative oversight of the sate capital budgeting and finance process.

Madam Chairperson, and members of the committee, if I could I will highlight the testimony. I understand you have a copy. I will cover some of the main points of it instead of the entire text of the statement.

The work of this subcommittee has resulted in a report to be released later this week entitled, "Capital Budgeting and Finance: The Legislative Role." The role of the legislature in financing capital investment is critical to any questions in relation to the consideration of a national infrastructure policy.

States and local governments are presently financing some two-thirds of infrastructure costs. I would urge this subcommittee's recognition of both State capabilities and State limitations to take on additional responsibilities.

I would like to focus my statement today on some of the findings and recommendations in this report. The report presents some 16 recommendations for improving the decision-making process involved with state infrastructure finance. In doing so, we identified those States which have taken the lead in thoughtful and innovative approaches.

The first recommendation made in the committee's report is for more focus to be placed on capital budgeting by State governments. The reason for this is threefold: Federal infrastructure assistance is declining; deficiencies in aging facilities demand attention; and the capital finance environment has been altered substantially.

Collapsing bridges, inadequate roadways, and court orders to construct new prisons are a testament to the need for greater infrastructure investment. It is estimated that State and local governments will need to invest $1 to $2 billion in 1982 dollars to address these capital needs.

Also, as I pointed out, the changing financial environment makes these goals seem less realistic. For example, the proliferation of measures to limit State government expenditures has reduced the States' ability to increase capital spending. Also, the effect of these reforms has been an increase in the issuance of State revenue bonds.

I think it is a particularly telling statistic to note that by 1985 the percentage of State non-guaranteed revenue debt, as opposed to general obligation supported debt, had grown to 80 percent of the total of State local debt. That is 80 percent, up from around 48 percent in 1975. The reason for that has to do with the limitations of general obligation debt, and it has to do with the creativity of State governments in responding to those limitations.

States are, in large part, recognizing the need for strengthening the legislative machinery for responding to infrastructure needs. Twenty-one States to date have established an independent capital facilities commission, State building commission, or other independent entity responsible for recommendations on capital projects.

The Capital Budgeting and Finance Committee recognizes the need for State legislatures to keep comprehensive inventories on existing capital stock, and to prepare long-range plans for capital needs. There are presently 30 States that keep written, central inventories, and 23 States which prepare capital facilities needs assessment reports. Of those 36 States with long-range capital plans, most span five or six years. On occasion, with Iowa and Illinois, you have a 20-year plan.

Of utmost importance in long-range planning is the ability to prioritize all capital projects and identify funding sources. Currently, some 14 States rank order all capital requests across departments. This affords the legislature the opportunity to gauge the relative importance of all projects. We list, in our testimony, some criteria for making those prioritization decisions.

In identifying funding sources, States have the flexibility to select from a variety of options. States have the options in financing capital projects of paying for it now, borrowing, or leasing. Idaho has established a permanent building fund to finance "pay-for-it-now" appropriations. In contrast, for example, Colorado and Oregon both use lottery proceeds for capital construction projects.

In most States, general obligation debt cannot be incurred without voter approval. Revenue bonds, while not requiring voter approval, are usually more expensive to market than general obligation bonds; however, user fee repayment of revenue bonds makes this type of financing an attractive public policy option.

Using earmarked revenues is another viable method of repayment. The State of Kentucky, for example, dedicates State-collected court fees to help finance county jail construction.

A recent innovation by the Massachusetts General Court provides enterprises and State authorities with small borrowing needs access to international foreign markets. I would point out that Massachusetts instrument, i.e., the Massachusetts Industrial Finance Agency, is very creative in several ways: it provides access to domestic, international markets; it allows the issuance of both taxable and tax-exempt debt; and it also allows the debt to be issued for public or private purposes, i.e., economic development kind of purpose. It is a very, in my view, creative and flexible instrument.

While States had historically restricted leasing, for example, to equipment, automobiles, and office space, recently enacted legislation authorizes lease-purchase and sale-leaseback agreements for university facilities, prisons, and State office buildings.

Before moving on to alternative financing approaches, I would like to point out the changes in Federal law which affect the issuances of State and local governments and debts in relation to those aspects of our capital financing policies.

The Tax Reform Act of 1986 effectively restricts the use of bond proceeds and the volume of new bonds. Legislatures are no longer able to rely on arbitrage earnings to cover issuance costs, and the volume caps will intensify the competition among projects.

These changes necessitate, more than ever, the active involvement of State legislators in overseeing debt management practices. In 1986 the Public Financing Management Board was created by the Rhode Island General Assembly for precisely this purpose. This Board functions as a clearinghouse to coordinate and prioritize all tax-exempt bonds issued by State and local governments.

Recent Federal budget and tax reforms have also made it more difficult for local governments to finance capital projects. States continue to provide a sizable amount of infrastructure assistance to local governments.

There are other innovative ways in which States are helping localities address infrastructure needs. For example, what are called interest rate buy-downs, bond insurance, State bond banks, and loan guarantees are such examples. States such as Maine, Nevada, North Dakota, and Vermont have made effective use of bond banks, while New Hampshire's loan guarantee program supports local water pollution control projects.

Nationally, State capital outlays account for 40 percent of State-local infrastructure outlays; however, in Delaware, Hawaii, Kentucky, Rhode Island, and West Virginia, State expenditures reached 60 percent of that number.

In order to decrease reliance on state support, NCSL's State-Local Task Force recommends that states provide local governments with more flexibility in generating revenues if that revenue support cannot be provided in a direct fashion. Arizona, Florida, and California all provide local tax options to finance highway construction.

Given adequate financing, the relative merits of capital requests still need to be weighed. In order for legislators to make sound judgments on these requests, alternatives to financing and alternative financing for proposed capital projects should be incorporated into the decision-making process.

But regardless of how we revamp the process for financing infrastructure repairs, the fact remains that inadequate funding for maintenance has greatly contributed to the state of physical deterioration in which we find our nation's bridges, roads, sewers, and prisons. The tendency, all too often, has been to put money in the most visible place—something new.

Our report discusses in detail the maintenance requirements of our public works stock throughout the country. New York, as an example, now requires a maintenance schedule for all projects costing $5 million or more. The State of Maryland maintains and publishes—to their credit, in my view—a regular maintenance report on their capital stock.

Madam Chairperson, members of the subcommittee, it is apparent to me from the work that I have been involved in on the Capital Budgeting and Finance Committee that we all have our work cut out for us. Doing business the old way is no longer an option. The key to our economic vitality is our infrastructure, and delays and shortfalls in its rehabilitation will be more costly in the long run.

I would ask, Madam Chairperson and members of the committee, that if it would be appropriate to have a full copy of our report presented to the committee and added to the record. That will not be available for a couple of days, unless the committee wishes my copy, which is marked up and totally unreadable, even to me.

Senator MIKULSKI. Well, the acting chair will reserve to the committee whether or not we'll put the entire report into the record. Sometimes those reports can be quite bulky, but the committee will accept the report, and then see how appropriately it should be included in the record.

Senator STAFFORD. Madam Chairman, could I just suggest that if it is bulky that it be incorporated in the record by reference rather than printed.

Senator MIKULSKI. Yes, we'll do that.

Mr. CONLEY. Madam Chairperson, if I could have one more minute to relay very briefly an experience we have had in Ohio, also, and I do that——

Senator MIKULSKI. Mr. Conley, we are going to have to move on. Could you do that in a crisp way?

Mr. CONLEY. Madam Chairperson, I certainly will. We had a $1.2 billion bond issue on the ballot yesterday in Ohio, and that was state support for local infrastructure needs. That passed about two to one, so there is an example of States providing direct support to localities.

I would point out, however, that that came to my committee and it was, from the Senate, a $1.8 billion issue. We cut it down by a third to $1.2 billion, and we did it for one reason, and one reason only, and the reason was not that the need wasn't established and the needs were clearly not out there—they were. But the issue was what we were going to be able to support in the long term in terms of the state budget in terms of our finance support, our bond, and interest debt payment. So it was cut back, but it passed, and I think that shows the general need in a state and the recognition of that need in a state by its citizenry.

Senator **Mikulski**. Thank you.

Now we're going to turn to Mr. Gerald Thompson, the Commissioner of Broward County, Florida, the vice-chair of the Transportation Steering Committee from the National Association of Counties.

Mr. Thompson, two points: one, Senator Bob Graham wanted to be here, but he's delayed at another committee; and, second, we know that you didn't pollute the Chesapeake Bay yet.

We want to welcome you here. If you wish to summarize your testimony, it will certainly be included in the record in full.

STATEMENT OF HON. GERALD THOMPSON, NATIONAL ASSOCIATION OF COUNTIES; AND COMMISSIONER, BROWARD COUNTY, FL

Mr. **Thompson**. Thank you very much, Madam Chairman and members of the committee.

I'd like to cite some of the activities of my county government, as I believe they are representative of many counties in our nation, and particularly those facing rapid growth.

In 1974 our citizenry adopted a Home Rule Charter giving land use control and environmental regulations to the county commission. We set out immediately to develop a comprehensive plan of capital improvements, transportation, and other elements to, in fact, manage growth.

Over the intervening years we have imposed impact fees on new development to recover the costs of their impacts on roads, schools, parks, and other public services. These impact fees have generated over $53 million to date.

This county and other counties lobbied quite heavily to request the State legislature to impose local sales tax. The counties were successful in getting the State to impose a half penny sales tax. A total of six cents in local option gas taxes was adopted by Broward County to attempt to meet infrastructure road needs. These are the maximum allowable by the Florida Legislature. To date we have generated $78 million per year, which we have shared with our 28 cities.

We have issued over $432 million in revenue bonds to construct improvements to water, sewer, airport, and road projects.

In 1978, in the face of Proposition I, our electors authorized us to sell $250 million worth of general obligation bonds for roads, jails, libraries, parks, and fire training facilities.

In 1981 we raised property taxes 29 percent in order to accommodate the needs of our infrastructure and services. Our budget hearings were covered by ABC, CBS, and NBC when our taxpayers were "up in arms."

In 1986 the electors again voted to tax themselves to the tune of $117 million in General Obligation Bonds to authorize the construction of criminal justice facilities such as court expansion facilities, facilities for the sheriff, for EMS, for central communications, and a parking structure for the courthouse.

We created an expressway authority and build 23½ miles of expressway connecting I-95, I-75, and I-595. This project was built in 18 months and financed by $200 million in revenue bonds, backed by tolls and the full faith and credit of the State of Florida.

Meanwhile, we have raised user fees on buses, parks, court filings, building permits, water, sewer, and garbage to reduce the pressure on property tax for operations and capital.

We are about to convert $500 million in polymode short-term financing to long-term industrial revenue bonds, and to begin the construction of two resource recovery plants and close our Davie Landfill.

In working with the Port Everglades Authority and a private developer, we are about to construct a $46 million convention center to enhance our economic development. This project results from the imposition of a three percent hotel tax.

Additionally, to meet the cultural needs of our community, the county, in joint harmony with other governmental entities and private donors, has provided $20 million of the $30 million needed for a Performing Arts Center scheduled for construction in 1988. I would note that $5 million each was provided by the state, county, city, and the Downtown Development Authority.

I would submit to the committee that we are carrying our share of our governmental partnership in building and maintaining America's infrastructure.

The total result of all the bonds issued and local option taxes and impact fees is in excess of $1.267 billion, and does not account for increased general user fees, nor additional property taxes.

The good news/bad news type thing: as an aside, I would like to mention another impact on county government throughout the nation, a new impact we've had to absorb. The past few decades has seen urban flight to the suburbs. This has left many cities unable to provide adequate human services, but, fortunately, they can't escape the county. Today county government, throughout the nation, is now a major provider of services to the elderly, handicapped, juvenile, and victims of drugs.

Thank you, Mr. Chairman.

Senator STAFFORD. Thank you very much, Mr. Thompson. It seems by default I am returned to a role I played for a number of years as chairman of this committee, and I kind of like it, even on a temporary basis.

I notice one of the very valuable members of our committee has come in. Senator Durenberger, do you have any comment or any matter at this point, Senator.

Senator DURENBERGER. None, Mr. Chairman.

Senator STAFFORD. All right. I'd like to ask all three of you the one question I also asked of Governor Schaefer when he was our witness, and that is: how do all of us—local, State, and national—elected officials get some credit for keeping up the infrastructure we have or restoring it to pristine state when it's deteriorating? Generally we get credit when we have a new building put up in our county, our city, or our State, and not much credit when we keep the roads we have up, or the waste treatment plants up, and so on. Is there some way we can get a little more recognition for keeping the infrastructure we have?

Mr. Mayor, do you want to lead off?

Mayor **Traficante**. Mr. Chairman, I know in my community, and throughout our state, each and every time we receive—whether it be grants, of course, or project monies for—whether it be wastewater treatment plants or upgrading of our roads, it is quite obviously known to the general public that the Federal Government has participated in many respects.

Senator **Stafford**. Thank you.

Mr. Thompson?

Mr. **Thompson**. Yes, Mr. Chairman. I think we have to go back and tell our message to the public that with a substantial investment throughout the nation of all government units, that it is important to maintain those. We can't throw them away and buy new ones. It's not like some of the disposable things we have in our society.

Senator **Stafford**. Thank you.

Mr. Conley?

Mr. **Conley**. Mr. Chairman, I think one answer, of course, is that one wishes to avoid the blame that comes from not keeping the infrastructure up, and approach it from that negative aspect, I suspect.

I think the answer you've heard is a correct one. If you communicate what you're doing in the way of improving and maintaining your existing capital stock, and make sure to do that to your citizenry, then I think there is a—I have a faith that they will understand the value of your efforts and the value of their dollar being used wisely.

Senator **Stafford**. Thank you very much.

I would like to say, Mr. Thompson, that coming from Vermont, that this morning we will give you the Calvin Coolidge award for brevity in your presentation.

Mr. **Thompson**. Thank you very much, sir. I had a meeting two nights ago with 800 people adjacent to my airport, and it went on for quite some time.

Senator **Stafford**. Thank you.

Senator Chafee?

Senator **Chafee**. Thank you, Mr. Chairman.

I'd like to address a couple of questions to Mayor Traficante.

First of all, I commend you on your testimony, and I think you merit the Calvin Coolidge brevity award because you went through your testimony and then directed us to the charts that were there, and I found that extremely helpful.

I also want to commend you on what you've done in your city on the sewer tie-in fees. On the Roger Williams project you described, as I understand that sewer installation was a combination of city and private funding. In other words, you got them to pay some.

Mayor **Traficante**. Correct.

Senator **Chafee**. Could you elaborate on how you do that, because that's an interesting technique. Usually people look and expect the city to provide the sewers. How did you get the company to provide some?

Mayor **Traficante**. What we did, Senator, in our city, over the past 2 years we established a sewer tie-in fee of approximately

$300,000 per residential home. We also established a second fee for——

Senator CHAFEE. How much, now? Three hundred——

Mayor TRAFICANTE. Three thousand dollars. Sorry.

Senator CHAFEE. Oh, $3,000.

Mayor TRAFICANTE. It's $3,000 per residential home. What did I say?

Senator CHAFEE. That's all right.

Mayor TRAFICANTE. Three hundred thousand?

Senator CHAFEE. For us around here, we deal in billions.

Mayor TRAFICANTE. I get carried away in Washington. I apologize. But it's $3,000 per residential home. We also established a second fee for sewer tie-ins for industrial commercial developments. So we do require each of our commercial industrial developments to participate in the sewer extension to that particular project via a particular fee.

Senator CHAFEE. Now, do you do that, Mr. Thompson, likewise?

Mr. THOMPSON. Yes, sir. We have a controlling device called the "platting" process, at which we——

Senator CHAFEE. Platting?

Mr. THOMPSON. Platting.

Senator CHAFEE. P-L-A-T-T-I-N-G?

Mr. THOMPSON. When a surveyor submits a plat that must be approved by the county commission, and that's when we attract all of our impact fees, plus set up a sewer service there. We have a method by which we can oversize the lines in this development to go out to the next one; and they, in fact, get their money, plus interest, back as it is used by the next developer.

Senator CHAFEE. Well, I thought that sounded like an interesting thing that Mayor Traficante did there.

Now, also, Mayor, you were describing that Howard Development Corporation as a quasi-State agency. How does that work out? How did you do that? Of course, I realize that was——

Mayor TRAFICANTE. This goes back to the Taft Administration in the 1970's.

Senator CHAFEE. That goes back prior to your time, yes.

Mayor TRAFICANTE. The city participated in a project with a State government. We basically gave the state a $400,000 loan to develop the property for industrial use and commercial use. We benefit, of course, from the development in the area each and every time a commercial development or an industrial development does locate there. But it is a combination, like I said, of State and local funding for that particular projects.

Ms. Cevoli could probably give you a breakdown of how the financing works regarding the location of every industry that may come to that particular project.

Senator CHAFEE. What happens if an industry comes into that project now, Ms. Cevoli?

Ms. CEVOLI. The Howard Development Corporation, the nonprofit agency that you discussed——

Senator CHAFEE. And that's a State agency?

Ms. CEVOLI. It is a quasi-public.

Senator CHAFEE. I see.

Ms. CEVOLI. It is set up by the legislature of the State of Rhode Island. Its purpose is to manage, to sell, to develop, to handle everything. It handles all transactions in Howard Industrial Park. It is separate from the State Department of Economic Development. It is separate from the City.

Senator CHAFEE. And they give title when somebody comes?

Ms. CEVOLI. Yes. Yes, they do.

So once a company is interested in Howard Industrial Park, many times they will come to the city or the State, wherever they choose. We show them the various sites throughout the city. If they choose Howard, then negotiation is made on price and whatever. Howard Development Corporation sets the price, a financial package is developed—can be developed with the State or with the city. We have used tax-exempt industrial revenue bonds very extensively—you'll see in the chart on Howard—up to the tune of about $23 million. So you see that it has extremely helped to have that instrument, as well as other instruments such as the SBA and our local revolving loan fund and State revolving loan fund.

We feel that without those tools, in the late 1970's or early 1980's, when there really was nothing happening in Rhode Island, development began at Howard, and that's where the mainstay of a very prestigious industrial park began, as you know, Senator.

Senator CHAFEE. Yes.

Mr. Conley, I'd just like to make a couple of points, if I might. There is a tendency to suggest that the Federal Government should do more in infrastructure development, but when you look at what the Federal Government is doing: in the interstates, of course, we're paying 95 percent; in the other highways we're paying 75 or 50, depending; on the sewers we're paying 75, and now 55 percent, the tax-exempt bonds.

What worries me, having dealt with State legislatures—at least the one I'm familiar with—is that we cannot get them to either set aside current appropriations for capital development—after all, the capital development is going to come along in a regular schedule—or to set aside proper monies for maintenance. The tendency always is to bond it. Is there any way that you've found in either your personal experience in Ohio, or in dealing with the other States, that some States truly wrestle with this capital development through their regular appropriations?

Mr. CONLEY. Senator, some States do, I think, a very good job of that; other States have a long way to go.

Senator CHAFEE. Could you name me one?

Mr. CONLEY. Michigan, for example, in looking at the maintenance question, has a very well-defined formula for determining and allocating maintenance costs over the long run. My recollection is that Rhode Island does a very good job at publishing and maintaining a complete schedule of their maintenance requirements for their capital stock.

Senator CHAFEE. Well, they may publish it, and maybe they're doing better now, but when I was Governor, I'd put a capital item in the budget, and they'd take that out, bond it, and take the money and use it for some current expenditure.

Mr. CONLEY. I think, Senator, we have some recommendations in that area, and most of it is related to: number one, you have to separate your capital budgeting from your operating processes; secondly, when you have a project you have to specify the construction, operating, and maintenance costs of that project and understand those costs; and then make some clear legislative determination of how you're going to fund those ongoing operating costs.

A prison, for example: my recollection is that the total cost of a prison, in an average sense you will pay about 10 percent of that in the construction costs, and over a 30-year period the other 90 percent will be in operating and maintenance costs. There are states out there, there are legislatures out there that are concerned with the construction costs of a capital project and pay scant little attention to the maintenance and operating costs, and they have to do that. A lot don't. Some have good mechanisms for doing that, but there needs to be improvement.

Senator CHAFEE. Okay.

Just quickly I'd like to ask Mr. Thompson: what are impact fees? Would that be like Mayor Traficante——

Mr. THOMPSON. No. We have those sewer and other charges, also, but we have an ordinance. The county has control of growth county-wide. We have adopted a home rule charter. We charge a developer "X" number of dollars per residential unit for road impacts, the traffic that's generated on our road system if it's under capacity.

Senator CHAFEE. Suppose he's going to build 70 houses that are going to create 80 more cars, and you know that that's going to clog your roads. Would you figure that out and he's got to apportion that to the widening the road?

Mr. THOMPSON. Yes, sir. We used CETA workers several years ago to individually develop the actual characteristics of every link in the traffic-way system, so it is not just a green book standard, it is actual capacity, and then we charge a fair share of how he impacts those links throughout the system. It is a very sophisticated tool, and it works well.

We also charge him for parks, the impact on parks, and the impact on schools.

Senator CHAFEE. So what might you levy on a developer per lot? Roughly.

Mr. THOMPSON. If he's developing in an area which has most of its infrastructure in place, it would be as low as around $3,000 for developing.

Senator CHAFEE. Per house lot?

Mr. THOMPSON. Per dwelling unit. If he is developing in an area where the infrastructure is overtaxed, he can pay as much as $8,000 a unit. It varies because of the impacts.

Mayor TRAFICANTE. Senator, what we have in Cranston, in addition to the sewer tie-in fee of $3,000 per household, we also have a development impact fee, as well, which basically impacts—we basically charge the monies relating to road impact, police/fire protection, library expansion, and also recreation expansion.

Senator CHAFEE. Is that a set amount?

Mayor TRAFICANTE. Set amount. The formula was developed by our city planner, Kevin Flynn, who is also here today.

Senator CHAFEE. What would that come to, roughly, per home?

Mayor TRAFICANTE. It's $1,400.

Senator **Chafee**. In addition to the $3,000.

Mayor **Traficante**. In addition to the $3,000 sewer tie-in. Correct.

Senator **Chafee**. Well, that's very interesting.

Thank you. Thank you mayor and commissioner. Thank you, Mr. Chairman.

Senator **Stafford**. Mr. Thompson, just for our information, how big is Broward County? Is Ft. Lauderdale the center, the largest municipality?

Mr. **Thompson**. Yes, sir. I came there in 1946. The whole county was only about 90,000 people. Today we are 1.2 million, and that's in an area that—Broward County is 1,200 square miles, 800 of which is everglades, and only 400 are habitable.

Senator **Stafford**. Is Palm Beach in Broward County or the next county?

Mr. **Thompson**. It's just the next county up, sir.

Senator **Stafford**. Yeah. And Miami would be the next one south?

Mr. **Thompson**. Yes, sir.

Senator **Stafford**. Thank you.

Mr. **Thompson**. Thank you very much.

Senator **Stafford**. I think that completes the panel. Thank you.

Mr. **Thompson**. Thank you.

Mayor **Traficante**. Thank you.

Mr. **Conley**. Thank you.

Senator **Stafford**. Our next panel consists of the following: Doctor Katherine Skelton, Project Coordinator, Local Roads Program, Cornell University; Ms. Peggy Ann Reichert, American Planning Association and Deputy Director for Planning, City of Saint Paul, Minnesota; Mr. Peter Butkus, Manager, Public Works Division, Department of Community Development, State of Washington; Doctor Richard Mudge, Apogee Research, Incorporated.

Please proceed in the order in which you were introduced.

STATEMENT OF KATHERINE SKELTON, PROJECT COORDINATOR, LOCAL ROADS PROGRAM, CORNELL UNIVERSITY

Ms. **Skelton**. Thank you. I'm very happy to be here.

I'd like to begin by referring to several of the comments made by Senators Stafford and Moynihan. Senator Stafford raised my interest in his comments that he had family members at Cornell and wondered if they knew of our program.

If they are joggers, they may have benefitted from some of the activities of the Cornell Local Roads Program. As a courtesy to the University we brought our falling weight deflectometer to test the resiliency of the new running track so it would be exactly like the old running track, which is a favorite of joggers. More commonly, we use our falling weight deflectometer to do road condition analyses of local roads in New York State.

I was especially pleased at Senator Moynihan's commitment to establishing a super-fast rail system in this country, not because I want to travel between New York and Washington any more rapidly but because some local highway officials are in buying up those old, outmoded rail cars to use as low cost bridge spans and culverts.

The Montana Technology Transfer Center, one of 41 in the country—New York is also one, has pioneered recycling rail cars, as reported in this month's Civil Engineering magazine. You can buy an old rail car for about $200. It's a very cheap alternative.

But I want to talk about some of the things we've been doing in New York State.

The existing road and street mileage in New York State is 110,000 miles, and in the United States it is almost 4 million miles—3,851,000. We have 3.2 million miles of rural roads, or low-volume roads, the road system that we deal with in the Technology Transfer Center of the Cornell Local Roads Program.

We are authorized originally, under the Rural Technical Assistance Program, which provided money, administered by the Federal Highway Administration and the State Departments of Transportation, to provide training and technical assistance to rural road agencies.

Each State differs. In New York State we have 1,600 local roads officials, both elected and appointed. What is common among these officials is their lack of sufficient technical training. Some of the people with whom we work lack a high school diploma. Yet, I must add, they are among the most motivated, dedicated public servants that I have had an opportunity with whom to work. They want to get training in skills needed to do their jobs.

I want to give you an example of some of the kinds of technical training we provide. Let me give you some material that I picked up from our laboratory yesterday.

[Ms. Skelton hands committee samples of asphalt.]

Ms. SKELTON. You do not have to put it in your record. You may wish to do so, I only intend it to be useful as an illustration here.

Senator STAFFORD. What is that?

Ms. SKELTON. I think you know it as blacktop or road pavement.

Senator BURDICK. We'd better incorporate it in the record by reference, Mr. Chairman.

Senator STAFFORD. So ordered.

Ms. SKELTON. I took the opportunity to bring this as a hypothetical example of a mistake. This is asphalt. It is material that was used to pave a county road in New York State last Fall. In the Spring that road failed. The cost of applying cold-mix asphalt to one mile of road in the Northeast, according to figures from the Vermont Local Roads Program, is almost $45,000. If you were to pave 10 miles of road—not a significant road mileage—you would be spending $450,000.

Normally cold-mix asphalt would have a life of about eight years, not six months. So the taxpayers in that particular county had to pay to have that road torn up and repaved. That's a very costly mistake, not billions of dollars, not millions of dollars, but when highway officials consume about 50 to 60 percent of a rural county or town or village or city's budget, even thousands of dollar are a very significant figure for the taxpayers in that locality.

What is the solution? The technology transfer center programs in 41 States have very realistic and very practical solutions. This material that I gave you failed for two reasons: one, you may have noticed it's a bit dusty. It's shale. It is not the proper material for roads; you can break it a apart in your fingers. You can imagine what heavy vehicle weight and vehicle loads do to this.

Secondly, I'd like you to look at it because you'll see that the black, glossy surface should be coating about 90 percent of that aggregate, and indeed it is not. There's nothing holding this material or binding it together.

The road was paved too late in the Fall. Cold-mix has to be applied early enough in the season so that it has proper time to cure. Poor material and poor timing can be serious problems, but training can help officials made better decisions.

The local highway official might not be in such big trouble if he had spent $10 to take a course offered by the Cornell Local Roads Program called, "The Basics of a Good Road." We offer a number of courses around the State, as all the technology transfer centers do. We also provide workbooks and reference manuals on how to pave your roads properly, how to manage your road systems properly, seminars on responsibilities of public highway officials etc. I will leave you copies of the materials that we provide for our students. These books are distributed free, upon request.

I bring this example to you not to say that roads officials in New York State make a lot of mistakes. In fact, they do not, in part because we have a program like the Cornell Local Program available to them. And I'd certainly would like to thank you for the kind of support that you've given to the establishment of these centers. It has been an important part of developing better management.

One thing that I feel is very important to address is the difference in philosophy with respect to our infrastructure crisis. Obviously the cost of upgrading is in the billions of dollars in terms of not just repairing the infrastructure, but just maintaining it at the level it is at the current time.

The technology transfer centers operate on a somewhat different philosophy. We believe, certainly, more money would solve many of our problems, but we are very committed to a philosophy that says "we have some dollars right now, the roads are deteriorating right now, and the local citizens expect us to maintain safe, decent, passable, efficient transportation systems. How can we maximize the resources available to us now. Upgrading skill level is as important as upgrading roads."

I would like to close my comments and answer any questions you may have about our program by reiterating the philosophy that if we talk about upgrading our infrastructure, the most important thing we need to upgrade is the managers of our infrastructure. Someone who lacks a high school diploma is responsible for maintaining geometrically safe roads, for maintaining roads that will last eight years, not six months, and for managing taxpayers' money very efficiently.

That's a rather big responsibility, and I strongly believe that responsibility can be met with the proper training, with the proper technical assistance, and with a proper professional commitment of a staff that is funded through programs like the Rural Technical Assistance Program.

I appreciate the opportunity to come before you and tell you about our program. And I have to say that I find it an equally awesome experience, and a humbling experience to work with highway superintendents and public works commissioners in our rural communities.

The success of our program has as much to do with the commitment of these people as it has to do with our staff.

You've had a certain boldness in investing $125,000 annually in technology transfer centers that have enabled 41 States in this nation to save millions of tax dollars. The money has been invested in human resources and it has been profitable.

Just to put that in perspective and close, our own program last year saved taxpayers $1,620,000, and that was an accurate estimate based on only a tiny sampling of the more than 2,000 highway officials we've had an opportunity to train.

Thank you.

Senator STAFFORD. Thank you.

I think we'll wait until all witnesses testify before we have questions.

Ms. Reichert?

STATEMENT OF PEGGY ANN REICHERT, AMERICAN PLANNING ASSOCIATION, AND DEPUTY DIRECTOR FOR PLANNING, CITY OF SAINT PAUL, MN

Ms. REICHERT. Thank you.

Mr. Chairman, members of the committee, Senator Durenberger, my name is Peggy Reichert. I am from Saint Paul, Minnesota, where I am Mayor George Latimer's Chief Planner. Among my various responsibilities, is the guidance of our city's capital programming process, which is a tool for managing our infrastructure.

Today, however, I am testifying on behalf of the American Planning Association. I would like to win one of your brevity awards, so I would request that my prepared statement be included in the hearing record, and I will try to just highlight my major points.

Senator STAFFORD. Your written statement will be inserted in the record.

Ms. REICHERT. The American Planning Association has a major interest in capital improvements programming as a management tool because many of our members work in capital programming at the state and local levels or as elected officials.

I have two purposes in testifying today. One, is to share with you the benefits that my city of Saint Paul has realized through capital programming. And, secondly, I would like to recommend, on behalf of the American Planning Association that Congress—that you—encourage state and local governments to get involved in capital programming as a way to make decisions on infrastructure.

Let me tell you about how we do things in Saint Paul and why it works so well. We have been at capital programming for 20 years, and we have a process now that involves many, many citizens, and neighborhood groups—besides our elected officials and our city staff. We have three documents that we prepare, and the process we follow is our capital investment decision-making process.

We have a capital allocation policy that is a set of statements on how to spend our capital funds. These policies include overall debt limitations, guidelines for the use of various types of funds, identification of priority areas for investment, minimum requirements such as return on investment, and even some prohibitions on certain types of expenditures. For instance, we no longer build swimming pools in the land of 10,000 lakes, and we have a moratorium on community centers in large part due to the operating costs and maintenance costs that are required by those centers.

Next, we have a 5-year capital improvement program that projects the next five years and looks at what we would need to do in the city. It identifies the timing, cost, fund source, and coordination needs for each project. This is a tentative schedule. It is not a real commitment, but it is a tentative schedule and a planning document that we share with all of our city departments, with our neighborhood groups, with other units of government, and with the utilities and the private business community so that all can get an early idea of what the city is thinking of doing and so that we can coordinate our actions ahead of time.

Finally, we have an annual capital budget that represents the actual commitment of funds to individual projects.

The benefits that we have realized through this whole process are both financial and political, and, quite simply, on a financial level, we have saved a great deal of money. By planning ahead, we can coordinate among functional areas. We only dig up streets once now. That may sound obvious, but we used to dig them up several times: one year to put in sewer; the next year we would have to put in new utilities, our new gas pipes; the next year, water. Now we do it once. We talk about it. We plan our actions ahead of time.

This is more than simple construction coordination because often our dollars come in different colors—this is a sewer dollar, this is a highway dollar—and we can only spend dollars in certain years, so it is quite an elaborate coordination program.

Secondly, we have been able, through capital programming with the school district and with the county, to coordinate our impact on our tax base of all of our programs. We now coordinate our spending plans and our bond issues, and we have reduced the overall impact on the taxpayer.

By sharing our plans for capital improvements with our neighborhood groups, we have realized many opportunities to leverage public dollars. We recently repaved a street in a neighborhood commercial area. That got the business community all excited, it decided to assess itself for the cost of new sidewalks, new street lights, trees, and benches. We now have a very beautiful commercial area.

We also can avoid costly crisis management by planning ahead, and we can avoid real financial disasters with everything falling apart at the same time.

We have found that—your question about how we can get people to appreciate just fixing what we have and not necessarily building new things—by involving our community in our capital budgeting process we have actually built a constituency for infrastructure, even unglamorous things like redoing the sewers or just redoing their street. We have even built public support to increase reliance on special assessment. So I think the answer is: if you can educate people, they really do appreciate having their streets fixed and their sewers running.

Finally, we have improved our bond rating by showing the bond rating agencies that we are, in fact, managing our capital assets.

So we have saved considerable dollars in debt service through capital programming.

On a political level, we now have consensus. We do not get stalled in building projects because the community is committed to what we finally decided to do. The quality of our decisions is much improved through this process because it is based on open competition, and no project survives that does not have a clear need and clear priority.

I think the whole quality of politics in Saint Paul has improved. Capital investment decision-making is not a scientifically rational process. It is, perhaps, the essence of politics in the best sense of the word. We find that by having a process that involves everyone, that brings information to the table, with everyone getting a chance to talk, we can at least make this a more thoughtful political process.

This experience that I have described in Saint Paul is not unique, and at this point I would like to submit some testimony from the infrastructure hearings that the House held last year, with some excerpts where local and State officials have demonstrated the importance that they place on capital improvement programming.

[The material referred to follows:]

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REFERENCES
TO CAPITAL IMPROVEMENTS PROGRAMMING (CIPs)
in
HEARINGS
BEFORE THE PUBLIC WORKS AND TRANSPORTATION COMMITTEE
# of the
HOUSE OF REPRESENTATIVES

99th Congress - First and Second Sessions

on

HR 1776

"THE NATIONAL INFRASTRUCTURE ACT"

Prepared by the

American Planning Association

for the

SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

August 26, 1987

George T. Marcou, AICP, Deputy Executive Director, American Planning Association
Nancy Schamberg Willis, AICP, Director, Government Affairs, American Planning Association

We have collected the following quotations from infrastructure hearings* state and locally elected officials which demonstrate the importance that local officials place on capital improvements planning and programming.

1. Bob Bolen, Mayor, City of Fort Worth, Texas
2. Russell Lancaster, Councilmember, City of Fort Worth, Texas
3. Mayor Federico Pena, Denver, Colorado
4. Mayor Harold Washington, Chicago, Illinois
5. Resolution by the National Governors Association on Infrastructure Improvements as a national priority
6. Gerald Schwerm, Director of Transportation and Public Works, Milwaukee County, Wisconsin
7. Robert P. Lemieux, Director, New York City Office of Construction
8. Carl S. Young, County Executive, Broome County , New York

Portions of the quotations in **bold type have been highlighted by APA.**

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*How to Solve the Nation's Infrastructure Problem, Hearings before the Committee on Public Works and Transportation, House of Representatives, 99th Congress, First and Second Sessions, on H.R. 1776, April 26, 1985 - February 22, 1986.

1. Testimony of the Honorable Bob Bolen, Mayor, City of Fort Worth, Texas, April 26, 1985: (p50)

   ". . . The City of Fort Worth has used a systematic process for planning and building its infrastructure for more than 50 years. Today, we have a sophisticated system that provides an inventory of our capital assets, an assessment of the condition of these assets and a process for identifying future needs. Every year, our budget process includes establishing a capital improvements budget which finances the construction of new facilities ranging from streets to fire stations and for the repair or replacement of existing facilities like a new exhibits hall and neighborhood parks. This budgeting process is the implementation phase of a three-year capital improvement program.

   The Capital Improvement Program is our means of establishing a building program for the next three years and for determining the appropriate combination of financing for these projects from local bonds and private funds as well as state or Federal funds."

2. Testimony of the Honorable Russell Lancaster, Councilmember, City of Fort Worth, Texas, April 26, 1985: (p 61)

   "The Mayor already has pointed out that the City of Fort Worth has used a systematic process to plan, build and maintain our infrastructure.

   Each year we continue to refine, update and improve this process. **We have highly capable people on our staff to help us, as poliycmakers, determine where we should expend and invest our resources to maximize the benefits and to lessen the impact of the cost to our citizens."**

3. Testimony of the Honorable Federico Pena, Mayor of the City of Denver, Colorado (p 136):

   "We also commit a great deal of effort to long-range planning of our transportation, utility, and park systems for the future. We use these long-range plans to help us identify capital improvement project requirements for the next 6 years. These major planning efforts help us to use the limited funds we have as wisely as possible."

4. Testimony of the Honorable Harold Washington, Mayor, City of Chicago, Illinois, (p 652):

   "The City of Chicago is working towards an objective of computerizing its infrastrucure information, enabling planners to ascertain the condition of any component of the City's physical plant, from a street to a water main to a sewer pipe, at the touch of a few buttons.

   When this information network is completed, it will provide a much improved data base on which to estimate the need for future improvements and make capital investment decisions. The capabiliy to prioritize capital projects on the basis of demonstrated need will become more important in a climate of increased needs and constrained capital resources. . . . These decisions must be made within a framework that sucessfully balances competing interests and maximizes the impact of dollars spent.

That framework is the capital improvements programming process and represents the rigorous project analysis conducted by too few of our cities and towns. We agree with the American Planning Association that such an analytical framework is a necessary part of project decision making. The current Chicago capital improvments programming process will be significantly strengthenened as better information becomes available on the condition of facilities and the needs for capital outlays."

5. National Governors' Association Resolution on Infrastructure Improvement as a National Priority (p697):

CAPITAL PLANNING

"Strengthening the nation's infrastructue will involve realistic capital planning by the three levels of government. To this end, the governors urge:

- Cooperation among state governments, Congress, the Administration, local governments, and others to compile data on the condition of each state''s capital structure and to assess future investment needs;
- **Strengthening the use of capital planning and priority-setting at the state and local levels;**
- Development of operation and maintenance budgets as part of the capital planning process;
- Use of state and local government needs assessments as the basis for all Federal capital initiatives; and
- **Improvement of the Federal government's analysis of its infrastructure programs so that decisonmakers are better equipped to analyze the adequacy and effectiveness of national capital investments."**

6. Testimony of Gerald Schwerm, Director of Transportation/Public Works, Milwaukee County, Wisconsin (p 966 and 967):

"The infrastructure partnership between Federal, state and local governments should be strengthenend by:

1. **Developing an information system to chart need.**
2. **Developing a plan to meet need.**
3. **Developing reliable funding sources to pay for the plan."**

7. Statement of Robert Lemieux, Director of New York City Office of Construction (p1121):

> **"One of the most important efforts that the city has undertaken has been the development of a 10-year capital plan to identify our investment priorities over this period and tie directly to our financing sources to fund the program.**
>
> Our 10-year plan is basically the establishment of a strategic planning program for capital expenditures. In formulating the plan and limiting the things that need to be done by available funds, it is obvious to us that the needs are substantially greater than the resources available to meet them . . .
>
> In formulating the plan, we have attempted to identify any and all potential sources of financing for the program, including things that the city hadn't previously used before. For example, our $3 billion Resource Recovery Plant Program is anticipated to be funded in its entirety by private funding. Another new funding source is the water and sewer authority recently authorized by the New York State Legislature that will fund water main and sewer construction and reconstruction from the proceeds of bonds it issues. These are paid for, along with the service itself, from water and sewer rates."

8. Testimony of Carl S. Young, Broome County Executive, Broome County, New York, (p 1401):

DEVELOP A PLAN

> **"A logical and important sequential effort to problem definition is plan development. Local government officials have a responsibility to decide what needs rehabilitation or replacement and to determine the necessity and importance of additional or expanded infrastructure based on local needs.**
>
> Factors such as safety, essential services, environmental impacts, financial impacts and social impacts must be considered in developing alternatives for problem solutions. In addition, the needs must be given priority ranking with the most urgent problems addressed first. All local governments have fixed or limited resources, and it is neither possible nor prudent to attempt to address every need immediately."

Ms. REICHERT. Over half of the cities and counties in this country already have capital improvement programming, and so do many of the states, as the representative from the National Conference on State Legislatures was indicating earlier. Not all of these programs follow the model we have in Saint Paul, nor do we think that they need do so, but they do show that people are willing to take a more thoughtful approach, and we think this should be encouraged, which brings me to my second and final point.

We believe that the Federal Government should encourage better decision-making on infrastructure planning and programming, and this could be accomplished by Federal funding assistance, if you choose to take that direction, to state and local governments in initiating or improving their capital programming process.

Also, should Congress decide to provide funding assistance for infrastructure projects, we believe that there should be a requirement that assisted projects be included in locally adopted capital programming.

It does not matter whether a budget office directs this decision-making process or the planning office or mayor or governor, it is all planning. We believe that there is an opportunity, through capital programming, to manage our infrastructure more effectively.

Thank you, Mr. Chairman.

Senator BURDICK. Thank you.

Mr. Pete Butkus?

STATEMENT OF PETE A. BUTKUS, MANAGER, PUBLIC WORKS DIVISION, DEPARTMENT OF COMMUNITY DEVELOPMENT, STATE OF WASHINGTON

Mr. BUTKUS. Honorable Chair and members of the committee, I bring you greetings from the other Washington, and Washington Governor Booth Gardner, who commends your efforts to explore and publicize innovative infrastructure efforts. As a Governor, a former county executive, legislator, and business-person, he knows well the value of the infrastructure in keeping this nation's competitive—sometimes edge and sometimes not quite on the leading edge—place in the international market.

My purpose in being here today is two-fold: to describe the state of Washington's Public Works Trust Fund, and to highlight four basic principles which have made the program a success.

I respectfully request, although I'm not trying for the brevity award, that my written documents, including the attachment, "The Need for Durable Products in our Society," be entered into the record.

I guess I have to say it doesn't really matter whether a community is in decline, whether it's stable, or whether it's experiencing rapid growth, good public works are important to maintain a community in arresting decline, as well as encouraging positive growth. Good public works are as important for an industrial-based community as for one whose economy is based upon information technology. In fact, good public works becomes the single-most important thing that local governments can provide in this nation's effort to maintain and expand foreign trade competitiveness.

I am going to cover seven areas, again as briefly as I can, today: first of all, what the public works trust fund is; a historical synopsis; some of the program philosophy; loan activity to date, future loan activity; its real successes; and some personal thoughts.

First of all, the Washington State Public Works Trust Fund: what is it really? Well, we consider it to be a unique, State-managed, low-interest revolving loan fund to assist local governments in financing certain public works needs.

The uniqueness of the program lies in three elements that differ from the historical response of the Federal and state governments to local government public works concerns. Those unique elements are, quite simply: the trust fund is capitalized on a pay-as-you-go basis rather than the sale of bonds with repayment from future revenues.

The second element is that financial assistance provided to local governments is in the form of loans rather than grants.

And last, but not least, when evaluating loan applications, the local government's effort to maintain its public works systems is considered along with the need for the project, as opposed to evaluating the project request solely upon the basis of need.

In the State of Washington's case, "local effort" is defined as comprehensive capital planning, system maintenance, willingness to obtain revenue or resources relative to that government's capacity, and last, but certainly not least, the management of those resources.

The loan program is guided by the state public works board, a 13-member policy board, with members appointed by the governor. Board membership includes: three from the association of counties; three from the association of cities; three from special purpose districts, such as water, sewer, and public utility districts; and four general public members.

The trust fund, as guided by the board, finances the repair, reconstruction, replacement, rehabilitation, or improvements to meet current standards and to adequately serve the needs of the existing population. Specifically, we fund bridge, road or street, water, sanitary sewer and storm sewer projects. New construction or growth-related construction, such as building a bridge where there is not a structure currently in place, is specifically excluded at this time.

The enabling legislation requires that the board submit a prioritized list of projects recommended for loans to the legislature, which then appropriates the funds on a project-specific basis from a dedicated account. The legislature may delete projects from the list but not—but not—add new projects to it.

Well, how did this unique funding source and method of business come about? It really started back in 1982 when the Joint Economic Committee of the Congress commissioned a multi-state assessment and published a report, "Hard Choices," which then indicated an increasing gap between this nation's infrastructure needs and our ability to pay for them.

That report, in early 1983, lead to a Washington State legislative proposal to provide some additional funding for infrastructure improvements by local governments. This proposal gave us the opportunity in Washington to start asking some hard questions, questions like: what really was the magnitude of the infrastructure problem in Washington? We had no good handle on it. What was the State's role in providing for infrastructure needs of local governments? We had done a number of flips and flops on various sides of the fence over the decades. Questions like: could the state really afford, in light of being close to its debt capacity, to provide a major influx of state funds for local government benefit? And, was a bond issue the best way for the state to provide the massive financing thought to be needed?

Those questions actually lead to an authorization—a direction to do a comprehensive inventory of what the critical, local public works needs were. Based on that inventory a report was made, and it found that the needs were large.

But it was important to note that over 40 percent of all jurisdictions in the state reported they could meet all their critical repair and replacement needs with no additional resources.

It is also critical to note, I believe, that of that 40 percent, nearly three-quarters of those jurisdictions were classified as special purpose districts providing a limited number of services, especially in the water and sewer fields.

The report went further to recommend the creation of a revolving, low-interest loan fund to help local governments pay for critical repair and reconstruction projects. The report also included several measures to increase the flexibility of our local governments to raise and invest tax dollars.

Well, again we consider ourselves somewhat unique as we look across the country. How did we get to this point? The philosophy of the program, as developed by a broad-based advisory board, was built from the ground up. We used those who were likely to be impacted by the decisions on whatever came out of the mill to help establish it. We had representatives from counties and cities and special purpose districts, the financial community, including bond council and underwriters, contractors, labor and engineering, as well as architectural interests. This mix truly helped us to ensure that interests that were going to be impacted by the program were also going to be instrumental in its design.

The program was, and is still an effort to develop a policy to respond to constricted Federal and state financial conditions. Therefore, the state has made no attempt to take the place of local financing responsibility, but rather has made a commitment to enhance local management and financing capacity to meet those locally-defined needs.

The state began by assessing local public works needs— and I might add you're doing a similar thing now through the National Council on Public Works Improvement—so that we had a clear picture of the problem. This also differed from a traditional response in Washington State of developing an answer before having a clear picture of what that problem was that we had to solve.

As a result, the philosophy that came out of this is that those solutions which are most effective in solving public works problems are found in two areas: improving the ability of local government to finance their own projects, and encouraging and assisting in developing of capital improvement planning and budgeting on the local government level.

It was, and again, it is still important that as the Federal Government continues its reduced financing role, and with the state continuing to experience pressure on a limited revenue base, to develop and enhance this new partnership between various levels of government, as well as the public and private sectors.

The trust fund is designed to be responsive to local needs and to be non-bureaucratic in its operations. The goal is to maintain administrative flexibility while developing a reputation for fairness and responsiveness.

A brief history of our loan activity to date: although small we are growing on an annual basis. Our first cycle, in 1986, we had over $116 million worth of requests for loans, and we only had $17 million to loan. It was a tough time for the board and their staff then, but they did come out with a prioritized list of projects for $17 million.

The second cycle, in 1987—let me back up a moment if I may, Mr. Chair. That first cycle also saw the board set a flat interest rate of 3 percent of the loans with 10 percent of the total project cost coming from the local government.

In the second cycle, 1987, we had just less than $18 million to loan, but the Public Works Board set up some new criteria. We tried the "carrot" as opposed to the "stick" approach to increasing local government participation, so the Board varied the interest rates from one percent to three percent. The more local participation, according to a set schedule, the lower the interest rate.

We also placed a greater emphasis on local management practices in terms of measuring local effort.

The third cycle, just having been completed with a list soon to be sent to our state legislature, has over $28 million in loan projects. The board has expressed its determination to continue with the three, two, or one percent financing based upon local share.

And now, looking ahead, by the year 2000 we expect to have $50 million available each year for loans throughout the state.

What are the real successes of this trust fund? I think they are basically in four areas: First of all, the program was built from the ground up. Again, those who were going to be impacted by it had a chance to help create it.

The process was kept simple, and I must say, with great pride, has remained simple. We believe that we're partners with local governments, and the program is not benefitted by excessively long or demanding loan application forms.

We started out with a strong emphasis on local management and planning, and are continuing to maintain that emphasis. All too often we had been rewarding bad management: we had been rewarding poor maintenance of facilities; we'd been rewarding those who hadn't taken much effort in terms of raising revenue to handle some of their own needs. The public works trust fund of the State of Washington tries very, very hard to reward only good management practices. We help those who are willing to take some efforts to help themselves.

Last, but not least, we periodically re-examine our policies. In terms of being good partners with local government, there are changing conditions that occur, and the board has expressed its desire to continue to be responsive to local government needs.

I'd like to close this up with some personal thoughts. I'm fortunate enough to have spent 6½ years as a mayor in a community in Washington before I moved to the Capital. Speaking from my old city hall perspective, I guess I have to say that I never, never had enough resources to do what I thought needed to be done, nor to do what the public was telling me they wanted done. So at one point I decided to stop complaining about the lack of resources and simply committed to do the best job I could with what I had.

I'd like to urge you, as a subcommittee, and the whole committee, and members of the legislative branch of this nation to move forward, to proceed, and do the best with what you have.

You have before you a strong basis for making decisions about national infrastructure issues: the work done by the National Council on Public Works Improvement, the testimony from people here before you today and at previous hearings, and you also have a resourceful staff to help you shape workable legislation.

Again, I urge you to do the best with what you have. You've got some great resources to do it with.

Thank you for inviting me to join you today. At the conclusion I will be happy to respond to any questions you may have.

Senator **Burdick**. Thank you.

Our next witness will be Doctor Mudge, Apogee Research.

STATEMENT OF RICHARD R. MUDGE, APOGEE RESEARCH, INC.

Mr. **Mudge**. Thank you very much, Mr. Chairman. I am pleased to appear before this committee to discuss some of the new ways local governments are using to finance infrastructure services.

By way of background, I am a transportation economist with more than 15 years experience in the public and private sector, and at the national and local levels of government. I am co-founder of Apogee Research, a Bethesda Maryland firm that specializes in solving economic, finance, and policy-related problems of public works. Until last year, I was Chief of the Public Investment Unit at the Congressional Budget Office. I greatly appreciate the opportunity to appear before you for the first time and read my own testimony. Despite that opportunity, I will not read every single word, however.

Before discussing some of the newer financial techniques now being used by local governments, let me review recent trends in public works spending.

The traditional measure of public works output has been the level of capital spending. Indeed, many people seem to measure success by the level of Federal grants, alone. While simple, this is misleading for two reasons: first, it encourages the view that public works are really pork barrel programs after all; second, spending is important only to the extent that it reflects efficient investments. The message here is that infrastructure is important for the services it provides: the movement of people and goods, and clean water that's provided.

Over the past 25 years, public spending on infrastructure has grown by more than 60 percent in constant dollars, and now exceeds $100 billion a year. Our net public assets invested in public works approach $1 trillion—clearly big business.

The steady growth in overall spending, however, camouflages two contradictory trends. As shown in the figure on page three, capital spending peaked in about 1970, while spending on operations and maintenance has shown steady growth as far as the eye can see. Indeed, since 1977 we have spent more to operate and maintain our public works than we have been investing in new capital improvements.

While public works outlays have kept pace with the nation's population growth—and there's a figure on page four which shows that—spending has declined as a fraction of gross national product, dropping from 3.6 percent of GNP in 1960 to 2.6 percent in 1984. There's a figure on page five which shows this.

Capital accounts for all of this change, dropping from 3.2 percent of gross national product in 1960 to about 1.1 percent today.

In looking at these numbers, however, it is important to remember that infrastructure spending, whether in absolute terms or relative to population or gross national product, only measures dollar inputs. It does not account for the output of public works, the services they are actual providing.

There have been significant shifts in the roles played by the Federal, state, and local levels of government over the past three decades. Let me summarize these.

While Federal capital spending has kept up with inflation, state spending has declined since 1970 and has remained below Federal spending over the past decade. In sharp contrast, local spending has shown steady growth, reflecting the need to maintain the facilities built during the 1960's and 1970's. As shown on page six, local spending on public works has almost doubled in the last 25 years.

Between 1960 and 1975 Federal grants accounted for up to one-third of the total state and local capital spending for public works. This percentage peaked at about 50 percent, largely due to sizable Federal wastewater treatment and mass transit grants during the 1970's. Today, however, Federal grants account for between 40 and 45 percent of total state and local public works capital spending.

There are three possible simplified interpretations for all these trends and numbers: first, we have been under-investing in public works; second, the demand for public works has actually declined; and, third, the productivity of our public works has improved. My personal opinion is that all three of those are true to some extent.

Let me now turn to some of the financial innovations being used by local governments. These comments rely on studies we've done for the National Association of Counties and for the National League of Cities.

With the financial constraints imposed in recent years by reduced Federal grants, coupled with taxpayer revolts and declining state funds, local jurisdictions have been forced to generate new ideas to help finance infrastructure. Different approaches have been tried for a variety of public works investments and in a wide range of local environments. My testimony provides examples of four of these techniques: special financing districts, exactions, utilities, and public/private participation.

While many of these techniques are most easily implemented in rapidly-growing communities, they can and have been applied under virtually all conditions. Indeed, while state and local laws and regulations may restrict their use in some cases, imagination and political will are often more significant barriers. Let me provide just one example.

Missoula County, Montana is a rural, slow-growing county that does not meet the stereotype for a source of innovative financing ideas. Since 1965, however, Missoula has been using Rural Special Improvement Districts to finance a variety of infrastructure projects ranging from relatively minor projects such as sidewalks to roads, utility expansions, sewer plants, and water projects. In addition to special districts for capital investment, Missoula also uses perpetual maintenance districts to support upkeep of improvements installed under the program.

Since 1985 almost 900 of these special districts have been created in Missoula County, alone. The full value of individual projects partially or fully funded through these districts has ranged from $50,000 to over $1.6 million.

There are a number of changes that the Federal Government could make to encourage State and local provision of infrastructure. My testimony discusses two of these: the use of trust fund cash balances to establish state and local infrastructure revolving funds, and the use of comprehensive performance monitoring as a way to improve decisions.

My testimony also closes with a review of some of the problems faced by perhaps the most neglected part of public works: smaller public works systems or low-density public works. These systems account for 60 to 80 percent of the individual public works facilities, but because of limited Federal attention, they tend to be neglected.

I appreciate the opportunity to summarize my testimony. I'd be glad to answer any questions.

Senator Burdick. Thank you.

By the way, where you have summarized, your entire statement will be made a part of the record. That's true for all of the witnesses here.

Thank you all for your testimony.

I'd like to ask one of the witnesses a particular question. Peggy Ann Reichert, you're from Minnesota?

Ms. Reichert. Yes.

Senator Burdick. I attended the University of Minnesota, where I majored in football and minored in law. For three months I lived in Saint Paul. I was impressed with Saint Paul: nice capitol building, small colleges along the river, nice people. But one thing didn't impress me, the downtown streets are so narrow. Have you done anything about them?

Ms. Reichert. We call that "charming."

Well, we have made many improvements, we have a one-way pair system, so that increases the capacity. We have finally finished Interstate I–35E. We turned it into a parkway, by the way, and have an alternate truck route, so we had a sort of creative solution there on how to get freeways through our city and through our neighborhoods, much like the issue, I guess, they had in Baltimore.

Senator Burdick. The Loop is still the Loop?

Ms. **Reichert**. The Loop is still the Loop, but it is quite beautiful today. A new world trade center——

Senator **Burdick**. I know it's beautiful, but two Model T Fords couldn't meet each other there, could they?

Ms. **Reichert**. Well, we have a good skyway system, too, so you can park on the outskirts of downtown and then walk for two miles in all enclosed space, which is very important in our weather.

Senator **Burdick**. I exaggerated in that Ford statement, you understand. I exaggerated. But I was wondering if they did any demolition to widen the streets or anything in this last 50 years.

Ms. **Reichert**. Well, I think in the 1930's they did redo Kellogg Boulevard. That might have been. I do not know when you were there.

Senator **Burdick**. Well, thank you very much. Thank you all for good testimony.

The record will be kept open for 30 days.

[Whereupon, at 12:10 p.m., the subcommittee was adjourned.]

[Statements submitted for the record follow:]

TESTIMONY OF

WILLIAM DONALD SCHAEFER

GOVERNOR OF MARYLAND

BEFORE THE

SUBCOMMITTEE ON WATER RESOURCES,
TRANSPORTATION, AND INFRASTRUCTURE

OF THE

COMMITTEE ON ENVIRONMENT
AND PUBLIC WORKS

UNITED STATES SENATE

NOVEMBER 4, 1987

Mr. Chairman, Members of the Committee. I am pleased to be here today to discuss with you the importance of maintaining and improving the nation's infrastructure.

I want to commend the Committee and particularly the Chairman of the Committee Senator Burdick and the Subcommittee Chairman, Senator Moynihan for holding these hearings. Maintenance and improvement of the nation's infrastructure is vital to our economy and to our continued growth. This committee has been instrumental in the past in encouraging the development of our nation's infrastructure. I appreciate knowing of your continuing interest and support for our nation's development.

Fifteen years ago some used to say that the best thing about Baltimore was the tunnel running under it. No one says that anymore. Baltimore has turned around. It turned around because of a partnership among the state and local government, the business community, the federal government, and especially the people of Baltimore. The pride Baltimore and Maryland have in the rebirth of the city is a pride that can be shared by this Committee and the Congress.

Infrastructure is a very big word. What is it? Well, when I think of infrastructure I think of where we get the water we drink. I think of how infrastructure helps clean the rivers and lakes we play in. I think of the schools we educate our children in. I think of the highways we drive on and the canals and shipping lanes that bring the products we need for American growth and prosperity.

In short infrastructure is the foundation of our lives. It takes many forms: roads, canals, hospitals, sewers, dams, water works, and bridges. Infrastructure is also the skills of our work force, the education level of our children, the attitude of business, and the responsiveness of government to the needs of a growing country. These are the areas we must address to assure a prosperous future.

As Governor of Maryland and earlier as Mayor of Baltimore, I know the importance of infrastructure. I also know that if we are going to improve it we need to plan now to meet the needs of the future. That is why I appreciate the work this committee is doing. We need federal participation. The states, the people, the towns, the private sector cannot do this alone. We're willing to do our share, but we need your help. We need you as a partner.

This year Maryland passed a 5 cent a gallon increase in the state gasoline tax. These revenues are devoted solely to increasing the state's highway and transit infrastructure. We are also devoting substantial state resources to school construction, water and sewer improvements and improvements in the state's environmental infrastructure. These state commitments are substantial. In my experience the legislature and the citizens recognize the importance of infrastructure, they are willing to pay for this type of an investment in the future.

Infrastructure improvements are one government expenditure that pays for itself. It's an investment. It pays dividends in the future. I might add that if the investment is not made we pay for that too, in the form of decreased economic growth, lost job opportunities, and decreased international competitiveness.

Infrastructure improvements create jobs today for the construction of the new facilities, and create jobs tomorrow when those facilities are used to enhance competitiveness. These benefits both direct and immediate and indirect and long-term justify the devotion of considerable resources by all levels of government on these essential capital items.

I would like to share some of my experiences with you. They point up the vital role the federal government plays in infrastructure improvement and how important infrastructure is to economic growth and development.

At the earliest stages of the rebirth of Baltimore, more than 15 years ago, the programs developed by this committee in the sixties and seventies were essential. Federal infrastructure programs provided the bulk of the financing. It was federal grants for urban renewal, sewer construction and waste water disposal, highway and mass transit improvements that provided the catalyst. It was the federal Urban Development Action Grant program combined with the proceeds from tax-exempt city and state Industrial Development Bond sales that provided the incentive for commercial interests to relocate to downtown Baltimore.

Neither the city nor the state could have financed these improvements nor attracted businesses to Baltimore if we did not have the participation of the federal government. The federal government was a reliable and energetic partner in the Baltimore renaissance.

Without your active participation Baltimore's dramatic comeback would have been impossible. Our nation has many cities in need of the same type of help Baltimore received, many small communities that need such a constructive partnership with the state and federal governments, many rural communities that cannot survive without that partnership.

I do not have to tell this committee of the environmental value of restoring the health of the Bay, our nation's largest and most productive estuary. But there are also important economic reasons for saving the Bay. Although we frequently do not think of it this way, the Chesapeake Bay is a vital part of our nation's infrastructure.

Its waters are used for drinking and nourishing our crops. Its shipping lanes provide an essential link for our commerce and trade. Its fish provide food not only for Maryland but the surrounding region. Its shores give recreation. Unfortunately, while our needs for this resource have not diminished, decades of neglect and increased demands for its benefits have sapped much of the vitality of the Bay.

The story of Chesapeake Bay oysters is but one sad chapter. A few decades ago, these waters provided a bountiful harvest-- 100 million bushels of oysters a year, employing tens of thousands of watermen. Today, the Bay's pollution has reduced the annual harvest to only 10 million bushels.

I raise the example of the Chesapeake Bay because it is a part of our infrastructure whose improvement is dependent on the concerted and coordinated efforts of three states, the District of Columbia and the federal government. But it is the federal participation that provides the glue that keeps the clean up program together. I appreciate the commitment the Committee made to the Bay through its work on the Clean Water Act. But the Bay needs more than a five year plan -- it needs a permanent commitment. We, as states, are in it for the long haul. Maryland and the other jurisdictions involved in the Bay restoration program will sign an historic agreement this December that promises an increased commitment from all of us, to the year 2000. That promise must be fulfilled by all partners federal, state and local. Those who say that it will cost too much to clean up the Bay should realize that we pay a greater price every day we delay.

One of my first acts after being elected Governor was to try to address the problems created in Cumberland Maryland by the closing of the Kelly-Springfield Tire Company's manufacturing facility in that community. The closure of that plant idled 1100 workers. The company also planned to move its headquarters out of the city which would have meant the loss of an additional 600 jobs.

The city government, Allegany County officials and the state joined together to produce an incentive package to keep the headquarters in Cumberland. Beyond this immediate crisis, however, the state and Allegany County officials joined together to work out a plan to revitalize the economy of the county and region. Alleghany County, on the border of West Virginia, suffers from the decline of traditional manufacturing industries and the disappearance of the jobs on which its economy has always depended.

The first step in the infrastructure process is to create the attitude in the government and the community that infrastructure is important, that action now can make the future better. Allegany County is now developing a plan for the future. Local officials are formulating their goals for the community and working with state officials to achieve these aspirations. These officials have already recognized the need to make the county less dependent on manufacturing -- to diversify the local economy and to improve the local infrastructure to attract new businesses and to retain existing industry.

As part of this plan, the state has committed to expediting the construction of the National Freeway which will provide a vital transportation link with the population centers of Washington and Baltimore. The state will also provide a new Airport Access Road to improve the air transportation link and is working with the private sector to try to attract additional air service to the facility. I should add that the federal government, as a result of the recently passed Highway Bill, is participating in these infrastructure improvements. It is another demonstration of how critical federal participation is to the success.

The National Freeway will provide a "Gateway to the Midwest" for the Port of Baltimore and is part of an overall plan to improve the port facility. The Port of Baltimore, and all of the ports of this nation are an asset that requires further investment. If we do not maintain modern transportation networks to these facilities, if we fail to maintain the shipping channels, if we fail to invest in modern port facilities, we will be left behind. In Maryland we are making the investment to modernize port facilities. But we cannot maintain the transportation network that links the port to the interior of the country nor maintain and deepen the shipping channels without continued federal assistance.

The benefits from the nation's port system are obvious. They are benefits shared by the entire country. Farmers and manufacturers are as dependent on the port's of our nation as are those living in port cities. In the global economy and global competition we now face, modern transportation to the ports is the deciding factor in the competitiveness of our agricultural and manufacturing sector in the world economy.

It is the need for federal participation that I must emphasize. No community large or small can undertake the capital costs involved in infrastructure improvement without the participation of the federal government. Federal participation was critical to Baltimore, it is critical to Cumberland and Allegany County and it will remain critical to every community large or small in Maryland and around the country.

I am concerned that recently the federal government has begun to disengage from these partnerships with state and local governments. There have been efforts to reduce the federal role in urban development, in sewer and waste water construction, in highway and mass transit funding.

I am pleased that the recently passed highway bill commits the federal government to continuing its partnership with the state and local governments for five years. We need you. We need your commitment, but we need to look beyond the next five years. I am concerned about the attitude that the federal government isn't needed or that it is not a proper governmental role to be involved in improving and maintaining our infrastructure.

This attitude has been translated not only into a reduction of federal assistance, but has also been seen in the recently passed tax bill which reduces the ability of the states to use tax-exempt bond authority to finance economic and community development projects.

I know this committee is not primarily responsible for these tax law changes but the impact of these revisions has been so dramatic on the states ability to finance infrastructure improvements that I must comment.

These changes have threatened the state's ability to address its infrastructure problems. For example, Boonsboro, a community of 4000 people in Washington County, Maryland recently faced the crisis of having to replace the town reservoir -- the only source of drinking water for the community. The cost of the repair and reconstruction was $135,000. That's $135 thousand, not million, or billion. But for this small community $135 thousand, nearly twice the annual budget of the town, was just as out of reach. Without water the town would die. That's how important basic infrastructure is to any community -- the difference between being a location where you can work and raise a family and being a ghost town. Boonsboro can't borrow $135,000 and if they could arrange financing it would be at adverse rates. For this reason, the state is developing a new program strictly for local infrastructure improvements. The state government will issue general obligation bonds and lend the proceeds to local communities for needed infrastructure improvements. This provides access to the capital markets for towns like Boonsboro and at the favorable rates the state's credit rating can command in the market.

The state has for many years funded new school construction in this way. Maryland is perhaps unusual in that all new school construction has been traditionally financed by the state, not local governments. The state sells bonds to finance these projects and turns the funds over to local governments who administer the construction contracts and use the proceeds of the bond issue to pay contractors. We are in the process of extending this program to other areas of infrastructure improvement including water supply and sewage treatment.

However, the tax reform act passed last year threatens these Maryland programs designed to improve the state's infrastructure. The arbitrage restrictions of the new law make it impossible for the state to turn funds over to local governments for these projects. The state is being forced by the new tax law to become the bookkeeper and contract officer for the entire state. Local school construction must be undertaken directly through the state government if we are to avoid the pitfalls of the new law which could jeopardize the tax-exempt status of these general obligation bonds. The state and local relations are strained by these new requirements and frankly it is far less efficient to administer construction contracts and pay contractors at the state rather than the local level. However, these federal restrictions force exactly this result.

Another recent problem has been created by the federal government's imposition of additional requirements on the states without providing additional support. In the last Congress additional burdens were placed on the states to monitor and approve each individual school's plan for inspecting and abating asbestos. In Maryland there are over 2,000 schools that will have to be monitored. The state government will spend half a million dollars on this effort. In addition, local communities will pay substantially more to meet the requirements of this federal law.

Title III of the Superfund Act provides additional regulation without additional support. Under superfund each state is required to keep a list and monitor all hazardous chemicals held by private businesses. Few would argue the value of controlling asbestos in schools. Few would complain about the need to monitor toxic chemicals. But if states are going to be required by the federal government to do more and if states are going to face legal liability to enforce additional controls, then the federal government in fairness, should provide some support and not just more regulation.

The attitude of hostility to governmental action that has developed in recent years grows out of the myth, often repeated, that everything government does is wasteful and unnecessary and that private industry is the sole repository of productive and beneficial activity. This attitude is flatly wrong. Henry Ford mass produced the automobile, but it was the government that financed and built the roads that made those automobiles useful.

There has been a recent tendency to rewrite the past in order to denigrate governments' contribution to our current prosperity. We should not nostalgically look back and see a past that never was in order to justify governmental inaction for the future. If we fail to act the economic benefits promised will not materialize, because the economic benefits we enjoy today did not result from governmental inaction.

It was for example, the federal government that subsidized the construction of the transcontinental railroads by providing land grants. It was the federal government that provided subsidizes in the form of lucrative air mail contracts to encourage the development of aviation in this country. And it was the federal government that had the vision to create the Interstate Highway System and provide a reliable transportation network for all Americans. In short, it has often been the federal government that has had the vision and courage to see the future and to finance the nation's development.

We need this kind of vision for the future. The replacement and maintenance of current infrastructure is essential, but equally important is a vision for the 21st century. I am heartened by the farsightedness of the Chairman of this Subcommittee. Senator Moynihan, your commitment to future competitiveness is exemplified by the bill you have introduced to further research and development of a high-speed rail system for passenger transport in the next century. If our nation is to be competitive in the next century we will have to develop new technologies for the future as we have in the past. We will have to invest now if we are to reap the dividends of that investment in the next century.

Maryland is committed to making that investment. As I stated earlier, we have increased state revenues to pay for infrastructure improvements. We have developed long-term plans for light rail passenger service between our metropolitan areas. We are working to improve our existing mass transit systems. I am concerned that the federal government is failing to share in this investment, that it is shrinking from the future.

If the federal government withdraws from our historic partnership, we will be unable to make the necessary investment for the future. Maryland nor any state cannot afford to make that commitment alone. Nor can we effectively coordinate a national transportation program without federal participation.

The nation as a whole has received substantial returns on our past investments. No one can doubt that the infrastructure investments of the last century and the first half of this century have more than paid for themselves. Investment in the nation's future today will pay off in a better standard of living for our children and grandchildren. This generation must do at least as much for the future as preceding generation's have done for us.

In my own personal experience, I know that private industry alone would not have revitalized Baltimore. It was the government that had the vision to see what the future could be and it was government investment in infrastructure improvement and direct encouragement to private industry that brought private investment into the partnership that revitalized the city.

Baltimore's rebirth increased property values, provided jobs, increased the tax base and improved the standard of living. These benefits cannot be captured by the private sector, and cannot justify private investment. But they do justify public investment. Some of the benefits are purely local and the local government naturally will invest to receive those benefits -- but some of the benefits are regional or national in scope and it is appropriate for the federal government to aid in the investment since it shares in the benefits.

So my message to you today is simple. We need you. We need your partnership, your active and constructive participation in restoring and improving the infrastructure of our nation.

We both know that some will criticize such a government investment as "wasteful spending." Thirty years ago individuals who lacked vision criticized the Interstate Highway System as a wasteful "pork barrel" project. Today, American's are still using that "pork barrel" highway system; it is still contributing to our economic well being.

Others will say that given the current deficit, "we cannot afford to make this infrastructure commitment." If we do not invest now in the nation's infrastructure, we will enter the 21st century ill-equipped to deal with its challenges, ill-prepared to meet its competitive demands, and unable to keep up with its pace of progress. We will be left behind.

CITY OF CRANSTON, RHODE ISLAND

Testimony Before Senate Subcommittee
on
Water Resources,
Transportation and Infrastructure

November 4, 1987

Mayor Michael A. Traficante

INTRODUCTION

Cranston is a city of 75,000 located in the heart of Rhode Island's heavily developed urban core. Its thirty square miles stretch from Narragansett Bay to the east to rolling farmland of the west. In between one finds a wide array of residential development of all types, attractive industrial parks and commercial areas. It is a community noted for its tradition of excellence in the provision of services to the public and in prudent government administration. The City has aggresively pursued expansion of its tax base through economic development and in the creative use of available private and public resources to accomplish economic development goals. Our success has been shown through our ability to maintain reasonable property taxes and excellent public services. This has not happened by itself, but rather is the result of continued and conscious efforts to use available resources wisely and promote the kind of beneficial community growth that helps support public services enjoyed by all.

Federal and state governments have played an important role in financing the kind of infrastructure improvements that allow a community to grow and/or improve its quality of life. The role of particularly the federal government in this important task has recently been threatened by a variety of cutbacks and revisions to the tax laws. The comments that follow provide a brief summary of Cranston's success in drawing from federal, state, local, and private resources, often simultaneously, to bring together projects and inspire the kind of growth that is a credit to the community.

HOWARD INDUSTRIAL PARK

In addition to serving as a home to 75,000 citizens, Cranston is also the host community for a variety of special populations. The Howard Complex within Cranston houses the state's entire prison population for adults and youths as well as the state's mental hospital. Until recently, one prison for medium security inmates sat alone amongst 190 acres of fields, overlooking Interstate Rt. 95 and easily accessible from the highway. It still sits there, (although a replacement facility is scheduled for construction soon). However, its neighbors are now 35 new manufacturing, office and warehouse establishments and the nearly 2800 employees who work in them. Over the last 10 years, the Howard Industrial Park has transformed an underutilized land resource with tremendous potential into the premier industrial address in Rhode Island, and perhaps the single most important economic development project in the City's history.

Numerous infrastructure improvements were required to transform raw land into industrial building sites. Improvements were begun in the mid 1970's, a time of sluggish economic performance in the Northeast, particularly in Rhode Island. Construction of roads, sewer lines, pumping stations and water lines were funded partly through a grant from the Economic Development Administration of $1,739,500. However, significant portions of the nearly $3.5 million to complete the required improvements came from loans from the City of Cranston and the State of Rhode Island, as well as loans from the private banking community. The City also provided sewer pumping station improvements at a cost of $50,000. A quasi-state agency, the Howard Development Corporation, was established to oversee the improvements and to market the properties to appropriate tenants.

In addition to providing needed financial incentives for infrastructure improvements, a combination of federal, state, and local resources was instrumental in providing the necessary financing vehicles for businesses looking to Howard as their new address. Over $2.6 million in financing was derived from the Small Business Administration's 503 and 504 programs. The sale of tax exempt State of Rhode Island Industrial Revenue Bonds has provided over $23 million in capital for these expanding businesses. The City of Cranston's own revolving loan program, initiated through a grant from the Economic Development Administration, has provided over a quarter million dollars of loan assistance, mostly in the form of "gap financing". The State of Rhode Island's revolving loan fund has provided an additional $105,000. (A summary of these costs is provided on the following page).

The results of these investments, mostly in the form of loans that are already being repaid, have been dramatic; as already mentioned 35 firms employing nearly 2800 people, representing a private investment of approximately $45 million. Taxes paid to the City of

HOWARD INDUSTRIAL PARK

SUMMARY OF COSTS

A. INFRASTRUCTURE (ROAD, SEWER, WATER ETC.)

1. Economic Dev. Admin. Grants	$ 1,739,500
2. State of Rhode Island Loan	$ 400,000
3. City of Cranston Loan	$ 400,000
4. Private Banking Loans	$ 900,000
5. Sewer Pumping Station (City)	$ 50,000
TOTAL	$ 3,489,500

B. FINANCING

1. Federal SBA 503/504	$ 2,652,000
2. State Industrial Rev. Bonds	$ 23,574,800
3. City - Revolving Loan Fund	$ 238,000
4. State - Revolving Loan Fund	$ 105,000
TOTAL	$ 26,569,800

SUMMARY OF BENEFITS

1. 35 Companies	2,770 Employees	
2. Taxes Due - 1987		$ 896,832
3. Cumulative Taxes	(1978 - 1987)	$ 4,523,004

Cranston since 1977 have been more than $4.5 million. Of that total, nearly $900,000 in revenues were collected in 1987. Many businesses that were among the first in Howard have already expanded their facilities. Properly serviced parcels are currently under development that will add seven new firms and an additional investment of nearly $10 million. The City's costs in providing services has been very low, mostly in the area of police and fire response and snow removal.

The development of the Howard Industrial Park has helped hold down personal property taxes for all Cranston residents. It would not have occurred without the funding cooperation of federal, state and local governments. It would also not have occurred without the creativity, vision and commitment of state and city leaders, who recognized the land's potential, and were willing to take risks in uncertain economic times to bring about change.

ROGER WILLIAMS FOODS

One of the largest and most recent economic development accomplishments in Cranston is the Roger Williams Foods Perishable Distribution Center located on Plainfield Pike in Western Cranston. Established in 1945, the Rhode Island based Roger Williams Foods is one of the top forty wholesale food distributors in the United States. Within New England, the company holds the ranking as second largest food wholesaler and eleventh largest privately-held corporation. Annually, sales exceed $390 million and corporate payroll is presently twelve million dollars for its' 540 employees.

In 1985, the city assisted Roger Williams Foods in choosing a 66 acre parcel which extended beyond the Western Cranston Industrial Area. The site presented a myriad of barriers to development such as appropriate zoning, sewer extension, and necessary highway improvements. The location of the parcel was appropriate for industrial zoning within the city's long range master plan guidelines. The sewer extension and roadway improvements, however, would require the use of financial resources which were not readily available.

Through a cooperative agreement with the company, the city has been able to extend sewer lines to the site. This arrangement combines $400,000 in public funds with $100,000 in private capital from the company. The extension will also service an additional forty-five acres of commercial and industrial property with tremendous development potential for future tax generation.

Highway improvements are slated to be made to Plainfield Pike, the access road to Roger Williams Foods and connecting with interstate I-295, during 1989. Funds for the upgrading of this state roadway will be provided by the Federal Highway Administration ($1,500,000) with matching dollars ($500,000) from the state. The upgrading will also serve the existing industries located within the 365 acre Western Cranston Industrial Area adjacent to Roger Williams Foods.

The Roger Williams Foods project represents a first phase of development which includes construction of a 160,000 square foot facility at a cost of $10 million. Phase I will employ approximately 150 individuals. Over the next ten years, the company plans to expand to 642,000 square feet (almost fifteen acres under one

ROGER WILLIAMS FOODS

SUMMARY OF COSTS

A. INFRASTRUCTURE

1. Sewer Installation (City)		$ 400,000
(Private)		$ 100,000
	TOTAL	$ 500,000

B. FINANCING

1. State Industrial Rev. Bonds	$ 9,475,000
2. Commitment of UDAG Repayments to IRB Financing	$ 1,600,000

SUMMARY OF BENEFITS

A. PHASE ONE - 1988

1. 160,000 s.f. Facility	150 Employees	
2. Annual Tax Revenue		$ 250,000

B. COMPLETION

1. 641,000 s.f. Facility	600 Employees	
2. Annual Tax Revenue		$ 700,000

HIGHWAY RECONSTRUCTION - 1989	$ 2,000,000

roof in what will be the largest building in Cranston) for an investment of $29 million and a total of 600 new employment opportunities. Anticipated tax revenue for Phase I is $250,000 annually. Anticipated tax revenue for Phase II is $700,000 annually.

Financing for the project was accomplished through a combination of R. I. Industrial Revenue Bonds and commitment of the income stream from two outstanding Urban Development Action Grants (UDAG) which the city had received during the early 1980's. Public assistance in the financing for this enormous undertaking was vital to the project's success. Of top priority to Roger Williams Foods was the ability to purchase an adequate amount of property to accommodate long term growth. Due to the skyrocketing cost of available industrial land, this goal would be unobtainable without the injection of public incentives.

The state of Rhode Island played a key role in the financing through its tax exempt industrial revenue bond program. This program enabled the company to obtain a favorable interest rate which encouraged a larger capital investment in the project. Of added benefit to the reduction of interest was the city's commitment of $1.6 million in UDAG paper.

It must be clarified here that the commitment of future anticipated revenues from the paybacks of our two UDAG's represented a creative approach to the challenge of assisting Roger Williams Foods with public funding. The amount of funding necessary to accomplish the long term goals of the company and ultimately provide a tremendous economic benefit to the city was completely beyond our reach. After consultation with regional HUD representatives, the concept of utilizing our UDAG paper as collateral or as an asset which could be purchased outright by a financial institution was presented. After much research with local financial institutions, we found that the terms which had been agreed upon with one of our UDAG's made the package less than attractive. One of our UDAG's does not have a required payback for 30 years. The other will begin repayment in early 1988 and continue over 15 years.

After careful negotiation with legal counsel, it became evident that the city would derive greater value through the commitment of existing resources over time than to attempt to gain an immediate cash value for these intangible assets. The arrangement set with Roger Williams Foods is a commitment of the projected income stream from primarily the $1 million UDAG for the period of 1988 through 2002 when the company will repay with interest the amount invested in the project. The income stream will be utilized to assist in the payment of the Industrial Revenue bonds and the company will repay the city with interest within a five year time frame (2002-2007). Additionally, the commitment of both UDAG's has been used to assist in collateralizing the bonds.

It is important to note that our recycling of UDAG's is a first for this city and is among a few such innovative approaches to economic development financing in the country. We were able to utilize a resource which was unavailable for years to come thus reaping an immediate $10 million investment in the community and a projected $29 million project.

Without the creative combination of resources identified above, the Roger Williams Foods Company may not have expanded to Cranston or been able to realize future expansion capabilities. Participation at all levels of government: federal, state and local, was vital to the success of the City of Cranston in attracting a company of this caliber.

KNIGHTSVILLE REVITALIZATION

Not all of Cranston's efforts in infrastructure improvements have been related to economic development projects where the relationship between costs and benefits is so clear and so favorable. We have never lost sight of the needs of Cranston's neighborhood infrastructure. One such project is currently underway in the City's Knightsville area. Knightsville is one of the city's oldest settled areas, but has recently suffered from general neglect, poor street conditions, inadequately sized sewer lines, and generally deteriorating conditions for years. We have spent more than $400,000 in community development block grant monies to accomplish street and sidewalk improvements, renovations to a memorial park, and other aesthetic improvements that reflect the strong ethnic flavor of the neighborhood. To date over a quarter of a million dollars has been committed to storefront improvements in the area. The critical element of the success of the Knightsville project was our ability to coordinate funding from a variety of services simultaneously to essentially recreate the entire infrastructure fabric of a neighborhood.

KNIGHTSVILLE REVITALIZATION

SUMMARY OF COSTS

A. INFRASTRUCTURE

1. Roadway Reconstruction	
a. Federal Highway Adm.	$ 1,955,000
b. State Matching Funds	$ 345,000
SUBTOTAL	$ 2,300,000
2. Sewer Line Replacement (City)	$ 70,000
3. Community Dev. Block Grants	$ 406,382

B. FINANCING

1. Storefront Improvements	
a. City - Revolving Loan Fund	$ 74,694
b. Private Funds	$ 157,147
TOTAL	$ 3,008,223

SUMMARY OF BENEFITS

Construction is still in progress, impacts in terms of tax revenue not yet discernable. Improvements in commercial area will strengthen its appearance and viability, as well as adjacent residential areas. Highway improvement will not only enhance public safety but will also incorporate great attention to landscaping and aesthetics through use of decorative paving stones, planting of street trees etc.

OTHER INITIATIVES

In an era of diminishing federal funding available for local infrastructure needs, the City of Cranston has also looked to other sources to assist the municipal government in providing for these needed services. Increasingly we have looked to the private development community for assistance.

The City has recently adopted sewer tie in fees to help defray the cost of expanding and replacing sewer pipes and pumping stations that carry sewerage to our recently completed wastewater treatment plant. We made a conscious decision to allow extension of sewer lines into developing residential areas in concert with the levying of a $3000 tie in fee for residential structures and similar charges based upon building square footage for commercial and industrial development. Based upon the development potential ~~of~~ the area to be sewered, we are confident that the fees to be collected will defray the $2.5 million cost for replacement of three sections of pipe and the expansion of three sewer pumping stations. The costs to the city will be minimal, but the benefits substantial. New home owners will have the security of municipal wastewater services, and the $3000 is in most circumstances less expensive than the cost of individual septic field installation. The City, by allowing for the extension of lines frees itself from the future possibility of septic related environmental problems, such as groundwater contamination.

We have also recently instituted a Capital Development Impact Fee to help address certain municipal infrastructure responsibilities, especially in our rapidly developing western section. This rural part of our otherwise densely developed city has seen a building explosion over the last four years. Over this period, Cranston has led the state in residential construction. This rapid pace of growth has forced the city to confront numerous capital needs - highway improvements, recreational developments, a new library, an expanded police station. We developed a fair share formula based on projected growth and projected needs for capital facilities. These needs were in turn based upon recognized local and national standards for provision of capital facilities. The result is a development fee whereby today's developer pays a relatively small portion of the total capital cost (approximately 15-20 per cent), the remainder to be borne by the city. In just over three months approximately $200,000 has been collected and placed into four dedicated accounts.

In addition to these measures, we have negotiated agreements with developers who need a zone change or subdivision approval, to perform certain capital improvements (such as road rehabilitation) as an essential component of their development. In such cases, the negotiated improvement is a direct and immediate result of the proposed development.

As we look to future projects, Cranston is considering the use of Tax Increment Financing as an important tool to encourage revitalization of blighted areas. Tax Increment Financing (TIF) is a method of funding public investment in an area slated for redevelopment by recapturing, for a period of time, all or a portion of the increased tax revenue that will result from the redevelopment. Taxes on the redevelopment area are frozen at a given base year. Additional revenues generated from the redevelopment of the property are used to pay off bonds that are sold on the bond market. These bonds are used to finance various public improvements that help make the redevelopment a reality. Funds from bond sales can be used for a variety of project related activities - highway improvements, traffic signalization, aesthetic improvements, parks etc. - those aspects of private redevelopment projects that are the most public.

The former Narragansett Brewery has sat vacant in Cranston for over 6 years, creating a blighting influence on surrounding commercial and residential areas. Finally there is private interest to redevelop this historic property into an exciting mixed use project of offices, housing, retail and restaurants. TIF will likely play an important role in financing various public aspects associated with the new development - improved area streets, traffic signalization and so forth. This will be a new type of financing for the City of Cranston. Indeed, it has not been widely used in the Northeast. However, our neighboring City of Providence has used TIF with great success and we expect to profit from their favorable experience.

It must be noted here that the current economic climate in Cranston has put us in a competitive position. Mandating private commitments for infrastructure and other capital improvements is only feasible within a boom economy. Our willingness to participate in Tax Incremental Financing may also be curtailed during an economic downturn.

Public funding for infrastructure and business growth must provide the continuity that our nations cities can rely upon to ensure economic stability. The projects described in this paper are not unique to this City. Throughout the nation communities have succeeded in combining federal and state resources with local initiatives to achieve economic growth.

As a mayor who has been active in national affairs, I recognize that sacrifices must be made to reduce our nation's deficit and protect our taxpayers from further burdens. I also realize that Cranston's experiences are not unique - cities throughout the country have benefitted from the resources outlined here today and have used those resources prudently. Still, the information I have provided this morning clearly illustrates the benefits these programs provide local property taxpayers and local government, and I encourage you and your colleagues in congress to maintain your commitment to our nation's cities and towns.

Thank you again for the opportunity to share with you Cranston's success story, and I would be pleased to answer any questions you may have.

Statement of

The Honorable Dean Conley

Chairman

Capital Budgeting and Finance Committee

THE NATIONAL CONFERENCE OF STATE LEGISLATURES

Chairman

Ways and Means Committee

Ohio House of Representatives

before the

Subcommittee on Water Resources, Transportation and Infrastructure

United States Senate

on

"STATE INFRASTRUCTURE FINANCE"

NOVEMBER 4, 1987

Mr. Chairman, members of the Subcommittee, thank you for the opportunity to appear before you today to discuss financing our nation's infrastructure needs. As Chairman of the Ways and Means Committee in the Ohio House of Representatives, I am acutely aware of the shortfall in revenue to finance all infrastructure deficiencies that have been identified in Ohio.

However, I am here today testifying on behalf of the National Conference of State Legislatures. I currently serve as the NCSL Chairman of the Capital Budgeting and Finance Subcommittee. This Subcommittee was formed in March 1985 and charged with developing recommendations for strengthening legislative oversight of the state capital budgeting and finance process.

The work of this Subcommittee has resulted in a report to be released later this week entitled; "Capital Budgeting and Finance: The Legislative Role." The role of the legislature in financing capital investment is critical to any consideration of a national infrastructure policy. States and local governments are presently financing some two-thirds of infrastructure costs. I would urge this Subcommittee's recognition of both state capabilities and state limitations to take on additional responsibilities.

Mr. Chairman, I would like to focus my statement today on some of the findings and recommendations in this report. The report presents some 16 recommendations for improving the decision-making process involved with state infrastructure finance. In so doing, we identified those states which have taken the lead in thoughtful and innovative approaches.

The first recommendation made in the Committee's report is for more focus to be placed on capital budgeting by state governments. The reason for this is threefold: federal infrastructure assistance is declining; deficiencies in aging facilities demand attention; and the capital finance environment has been altered.

Although in 1985, the states spent more than $30 billion on state capital outlays, the rate of investment is not keeping pace with escalating capital needs. In constant 1982 dollars, federal grants-in-aid for physical capital investment have declined from $24.7 billion in 1979 to $20.9 billion in 1987. While declining state investment in infrastructure can in part be explained by a reduction in Interstate funding, tighter state budgets are redefining capital spending as a a luxury.

This is not to suggest that capital spending on infrastructure can be foregone. Collapsing bridges, inadequate roadways and court orders to construct new prisons are a testament to the need for greater infrastructure investment. It is estimated that state and local governments will need to invest $1-2 billion in 1982 dollars to address these capital needs.

However, the changing financial environment makes these goals seem less realistic. The proliferation of measures to limit state government expenditures has reduced the states' ability to increase capital spending. The effect of these reforms has been an increase in the issuance of state revenue bonds. By 1985, the percentage of state nonguaranteed debt had grown to 80 percent of state long-term debt. In addition to these changes in state financing environments, changes in the federal tax laws have made such options as bond bank and public-private financing arrangements less appealing.

States are in large part recognizing the need for strengthening the legislative machinery for responding to infrastructure needs. Twenty-one states to date have established an independent capital facilities commission, state building commission or other independent entity responsible for recommendations on capital projects. In addition, 17 houses and 16 senates have a committee or subcommittee that focuses on capital outlays issues.

In its report, the Capital Budgeting and Finance Committee recognizes the need for state legislatures to keep comprehensive inventories on existing capital stock and to prepare long-range plans for capital needs. There are presently 30 states that keep written inventories and 23 states which prepare capital facilities needs assessment reports. Of those 36 states with long-range capital plans, most span five or six years. Iowa's and Illinois', however, cover 20 years.

One method that has been successfully utilized linking long-range and immediate capital budget plans is that employed by the State of Louisiana. A comprehensive capital budget law enacted in 1980 requires the Governor to submit a five-year program to the legislature. The legislature, in acting upon this proposal, must enact the first year as the capital budget and adopt by resolution the last four years of the program. In 1983, New York passed a comprehensive State Finance Law. This law requires a five-year capital plan to accompany the annual budget submitted to the Assembly Chairman of the Ways and Means Committee. Unfortunately, in 16 states the legislature is not involved in the preparation of a long-range plan.

Of utmost importance in long-range planning is the ability to prioritize all capital projects and identify funding sources. Currently, some 14 states rank order all capital requests across departments. This affords the legislature the opportunity to gauge the relative importance of all projects. The State of New York has developed five principles for determining priorities and directing state financing:

1. The rehabilitation of essential public facilities is given priority.
2. Investment in new facilities is judged by potential for economic development and responsiveness to changing public service requirements.
3. User fees and other special revenues are utilized rather than general revenue.
4. Obsolete capital assets are to be divested or managed by the private sector.
5. Emphasis on economic opportunities for the unemployed, minorities and women in the state's capital development programs.

In evaluating a capital project, the Michigan Legislature uses such criteria as the environment of the state, compliance with any court order, and replacement of obsolete facilities. Illinois considers economic impact and safety problems. Louisiana focuses on emergency need and cost savings. And South Carolina utilizes accreditation, matching funds and repair versus new construction.

In identifying funding sources, states should have the flexibility to select from a variety of options. States have the options in financing capital projects of paying for it now, borrowing or leasing. Idaho has established a permanent building fund to finance "pay-for-it-now" appropriations. Colorado and Oregon both use lottery proceeds for capital construction. The opponents of this type approach lodge criticisms that the cost is not spread out over the life of the asset nor is it spread among users.

Constraints on capital financing are particularly noticeable in the use of debt financing. In most states, general obligation debt cannot be incurred without voter approval. Revenue bonds, while not requiring voter approval, are usually more expensive to market than general obligation bonds. However, user fee repayment of revenue bonds makes this type of financing an attractive public policy option. Using earmarked revenues is another viable method of repayment. The State of Kentucky dedicates state-collected court fees to help finance county jail construction.

A recent innovation by the Massachusetts General Court provides enterprises and state authorities with small borrowing needs access to international financial markets. The 1987 Act allows the state's Industrial Finance Agency to coordinate bond sales of local businesses with those of state agencies. Eligible agencies include the Turnpike Authority, the Port Authority and the Water Resources Authority.

Lastly, leasing as a capital finance mechanism gives a state the option of paying in installments rather than in a lump sum. While states have historically restricted leasing to equipment, automobiles and office space, recently-enacted legislation authorizes lease-purchase and sale-leaseback agreements for university facilities, prisons and state office buildings.

Before moving on to alternative financing approaches, I would like to point out the changes in federal law which affect the issuances of state and local governments. The Tax Reform Act of 1986 effectively restricts the use of bond proceeds and the volume of new bonds. Legislatures are no longer able to rely on arbitrage earnings to cover issuance costs, and the volume caps will intensify the competition among projects.

These changes necessitate, more than ever, the active involvement of state legislators in overseeing debt management practices. In 1986, the Public Financing Management Board was created by the Rhode Island General Assembly for precisely this purpose. The Board functions as a clearinghouse to coordinate and prioritize all tax-exempt bonds issued by state and local governments.

Recent federal budget and tax reforms have also made it more difficult for local governments to finance capital projects. States continue to provide a sizable amount of infrastructure assistance to local governments. Efforts to minimize the impact of federal policies on local governments are exemplified in Utah's Wastewater Project Financial Assistance Program.

This program, established in 1983, utilizes a revolving fund mechanism to creatively leverage state funds for local use. The States of Pennsylvania and New Jersey have similar programs to assist local governments in financing infrastructure development.

Other innovative ways in which states are helping localities address infrastructure needs are interest rate buy-downs, bond issurance, state bond banks and loan guarantees. States such as Maine, Nevada, North Dakota and Vermont have made effective use of bond banks, while New Hampshire's loan guarantee program supports local water pollution control projects. A variation on the guarantee loan program is found in Oklahoma and New Jersey where a set-aside from a state revolving loan is directed to communities with low or no credit ratings.

While increasing state aid is an important means of assisting localities, easing restrictions on indebtedness and offering technical assistance are two options that should not be overlooked. Nationally state capital outlays account for 40 percent of state-local outlays; however, in Delaware, Hawaii, Kentucky, Rhode Island and West Virginia, state expenditures reach 60 percent.

In order to decrease reliance on state support, NCSL's State-Local Task Force recommends that states provide local governments with more flexibility in generating revenues. Arizona, Florida and California all provide local tax options to finance highway construction. This increased taxing authority combined with flexibility in incurring debt stand to provide localities with the tools of self-sufficiency.

Given adequate financing, the relative merits of capital requests still need to be weighed. In order for legislators to make sound judgments on these requests, alternatives to financing and alternative financing for proposed capital projects should be incorporated in the decision-making process. Estimates of operation and maintenance costs must be viewed as part of the capital investment. The Florida Public Facilities Conversion Trust Fund, created in 1980, provides state agencies with funds to convert surplus state property and schools in lieu of building new facilities. As a matter of course, the State of California reviews alternative financing techniques as it evaluates each project.

In budgeting capital expenditures, state legislatures should separate operating from capital costs, as well as planning from construction costs. This increases the level of oversight. In Louisiana, projects requiring more than one year to complete must be funded in at least two stages. Kentucky puts all $1 million plus projects to analysis by the state's engineering department.

But regardless of how we revamp the process for financing infrastructure repairs, the fact remains that inadequate funding for maintenance has greatly contributed to the state of physical deterioration in which we find our nation's bridges, roads, sewers and prisons. The tendency all-too-often has been to put money in the most visible place...something new.

Inadequate maintenance has been compounded by the effects of aging. Much of our infrastructure is reaching the end of its "design life." To combat these problems, states are beginning to look at prespecified maintenance schedules. New York now requires a maintenance schedule for all projects costing $5 million or more. The State of Maryland maintains and publishes a regular maintenance report. And the State of Michigan has identified the basic premises of a successful formula for maintenance.

Although the issue of "privitization" can sometimes be politically sensitive, particularly in the context of federal mandates, several states have used privitization or contracting out successfully for years. Twenty-eight states require competitive bidding on all capital projects. Albeit a complex public policy question, the feasibility and desirability of contracting with the private sector should be part of the capital budget review process.

Mr. Chairman, members of the Subcommittee, it is apparent to me from the work that I was involved in on the Capital Budgeting and Finance Committee that we all have our work cut out for us. Doing business the same old way is no longer an option. The key to our economic vitality is our infrastructure, and delays and shortfalls in its rehabilitation will be more costly in the long run.

As the Congress surveys the infrastructure deficiencies of this country, I urge that state programs be explored for effective approaches. In closing, I would like to thank this Subcommittee for focusing attention on this issue and for providing me with this opportunity to contribute to the discussion. I would ask that the text of the NCSL report, "Capital Budgeting and Finance: The Legislative Role," be incorporated in the committee report on this subject.

**NATIONAL
ASSOCIATION
of
COUNTIES**

*440 First St. NW, Washington, DC 20001
202/393-6226*

STATEMENT BY

GERALD THOMPSON, COMMISSIONER

BROWARD COUNTY, FLORIDA

AND

VICE CHAIRMAN, TRANSPORTATION STEERING COMMITTEE

NATIONAL ASSOCIATION OF COUNTIES

BEFORE THE

SUBCOMMITTEE ON WATER RESOURCES, TRANSPORTATION,

AND INFRASTRUCTURE

SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE

NOVEMBER 4, 1987

WASHINGTON, D.C.

Mr. Chairman, my name is Gerald F. Thompson.

I am a Commissioner in Broward County, Florida, and Vice-Chairman of the Transportation Steering Committee of the National Association of Counties (NACo)[*]

I appreciate the opportunity to testify before the Senate Sub-committee on Water Resources, Transportation and Infrastructure on the subject of innovations in infrastructure at the county level.

I would like to cite some of the activities of my County Government as I believe they are representative of many counties in our nation and particularly those facing rapid growth.

In 1974, our citizens adopted a Home Rule Charter granting County-wide control of land use planning and environmental regulations to the County Commission. We set out immediately to develop a comprehensive plan including, of course, a capital improvements program and transportation plans.

Over the intervening years, we have imposed impact fees on new development to recover the cost of their impacts on roads, schools, parks and other public services. These

[*] The National Association of Counties is the only national organization representing county government in the United States

Throughout its membership urban, sub-urban, and rural counties join together to build effective, responsive county government.

The goals of the organization are to:

-- improve county government;
-- serve as the national spokesman for county government;
-- act as a liaison between the nations', counties, and other levels of government;
-- achieve public understanding of the role of counties in the federal system.

impact fees have generated over $53,400,000 to date.

This County and other Counties lobbied quite heavily to request the State Legislature to impose a local sales tax. The Counties were successful in getting the State to impose a half cent sales tax. A total of six cents (6¢) local option gas tax was adopted by Broward County to attempt to meet infrastructure road needs. These are the maximum allowable by the Florida Legislature. To date we have generated approximately $78 million per year which we have shared with our 28 cities.

We have issued over $432 million in revenue bonds to construct improvements to water, sewer, airport and road projects.

In 1978, in the face of Proposition I our electors authorized us to sell $250 million worth of general obligation bonds for roads, jails, libraries, parks and fire training facilities.

In 1981, we raised property taxes 29% in order to accommodate the needs of our infrastructure and services. Our Budget Hearing was covered by ABC, CBS, and NBC when our taxpayers were "up in arms."

In 1986, the electors again voted to tax themselves to the tune of $117 million in General Obligation Bonds to authorize the construction of criminal justice facilities such as court expansion facilities for the Sheriff, for EMS, for Central Communications, and a parking structure for the courthouse.

We created an Expressway Authority and built 23½ miles of expressway connecting I-95 to I-75 and I-595. This

Page three

project was built in 18 months and financed by $200 million in revenue bonds backed by tolls and the full faith and credit of the State of Florida.

Meanwhile, we have raised user fees on buses, parks, court filings, building permits, water, sewer, and garbage to reduce pressure on property tax for operation and capital.

We are about to convert $500 million in "polymode" short term financing to long term Industrial Revenue Bonds and to begin to construct two resource recovery plants and close our Davie Landfill.

In working with the Port Everglades Authority and a private developer, we are about to construct a $46 million convention center to enhance our economic development. This project results from our imposition of a 3% hotel tax.

Additionally, to meet the cultural needs of our community, the County, in joint harmony with other governmental entities and private donors, has provided $20,000,000 of the $30,000,000 needed for a Performing Arts Center scheduled for construction in 1988.

Note: $5,000,000,000 each provided by state, county, city of Ft. Lauderdale and Downtown Development Authority.

I would submit to the Committee that we are carrying our share of our governmental partnership in building and maintaining America's infrastructure.

The total result of all bonds issued and local option taxes and impact fees is in excess of $1,276,800,00 and does not account for increased general user fees or additional property taxes.

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As an aside, I would like to mention another impact that County Government has had to absorb. The past few decades has seen urban flight to the suburbs. This has left many cities unable to provide adequate human services. County Governments throughout the nation are now major providers of services to the elderly, handicapped, juvenile, and victims of drugs.

Thank you Mr. Chairman

1976	Gas Tax Rev. Bond	$ 26,000,000
1976	State of Fla. Anti Pollution Loan	$ 8,900,000
1978	Revenue Bond Wastewater	$ 49,520,000
1978	General Obligation/Property Tax Jail/Parks/ Library etc.	$250,000,000
1978	Adopted Impact Fee Ordinance Requires Developer to Pay Park, School & Road Impact Fees	$ 53,400,000 (to date)
1981	Raised Property Taxes 29% Covered by ABC CBC NBC	
1982*	Imposed 1/2¢ Sales Tax as authorized by Leg.	$54 mill annually
1983*	Imposed 4¢ Local Opt. Gas Tax	$16 mill annually
1983	Issued Airport Revenue Bond	$259,000,000
1984	Sawgrass Expressway Revenue Bonds	$200,000,000
1984	Local Option Gas Tax Revenue Bond	$ 31,120,000
1985*	Imposed 2 (additional) Local Option Gas Tax as Authorized by Legislature	$8 mill annually
1986	First Fla. Gov. Fin. Bond (to complete 1978 Bond Projects)	$ 43,900,000
1987	Criminal Justice General Obligation Bonds	$117,000,000
1987	First Fla. Gov. Fin. Bonds Fire Equipment & Heavy Machinery	$ 7,985,000

Over the same time frame we have raised bus rate-park, court, building and other user fees on a regular basis. Water sewer and garbage have increased to fund bonds.

*SHARED WITH CITIES

CORNELL UNIVERSITY

LOCAL ROADS PROGRAM
607-255-8033

REPORT TO THE U.S. SENATE SUBCOMMITTEE ON WATER RESOURCES, TRANSPORTATION AND INFRASTRUCTURE

Prepared by Dr. Katherine Skelton, Cornell Local Roads Program
Cornell University Department of Agricultural and Biological Engineering
October 28, 1987

Public attention to the worsening condition of our nation's infrastructure has been highlighted by recent public reports of the high percentage of our bridges and roads that are in substandard condition. For those responsible for maintaining our roads and bridges, such reports are not surprising. As this Subcommittee has heard already, millions of miles of roads are in poor or very poor condition and an unacceptable percentage of our bridges are in poor repair.

In addition to the very serious concern with highway safety, to the public, the poor condition of streets impacts heavily on road user costs, particularly in shortened vehicle life and higher repair costs. While it may seem repugnant to many of us, it is commonly known that in New York City, for example, where the poor condition of its streets is legion, lawyers advertize to promulgate suits against the municipal government and businesses have been formed to index the existence of potholes —not so that roads can be made better and safer, but so citizens can file claims under the prior written notice law if they hit a pothole. The need to address the issue of upgrading our deteriorating roads and bridges will require solutions that are more complex than reaching into the federal checkbook.

Three factors are cited as the cause of this infrastructure crisis: the changing usage pattern on our older road and bridge networks, the escalating maintenance costs, and the decline in revenues from traditional tax sources.

There is a fourth factor to consider in this complex picture, one which is often overlooked yet plays a pivotal role in helping to meet the challenge of solving our infrastructure crisis. I refer to the human factor — the highway and public works officials serving their local communities in elected or appointed positions. Training and education are needed to bring innovative technologies (pavement recycling, for example) and better management practices (computerized data bases to optimize the timing of pavement rehabilitation, for example) into the daily routine of public works departments across the county.

In New York State there are more than 1600 units of local government. Unfortunately many of our public works officials in office have not had opportunities to receive adequate training or to develop the increasingly sophisticated technical skills necessary to adequately perform their jobs. The consequence of this, of course, is brought home daily in higher than necessary user costs, accidents and loss of life, and additional burdens on taxpayers for maiantenance and construction.

Is there a solution? The Rural Technical Assistance Program in 1984 authorized funds to establish Technology Transfer Centers under the administration of the Federal Highway Administration. Funded jointly by FHWA and the New York State Department of Transportation, the Cornell Local Roads Program Technology Transfer Center was established in October, 1984. Today, there are 41 Technology Transfer Centers in the United States. Each Center operates under a similar mandate to provide technical assistance and training.

The Cornell Local Roads Program Technology Transfer Center provides training throughout New York State, operates an information and publication service for local roads officials, and gives technical assistance to highway and public works departments. In addition, it assists transportation officials to maintain a network of peer support by publishing an annual directory of all roads officials in New York State. Details of the Center's activities are included in the appended documents.

At an annual program cost of $125,000, local roads officials in New York State who participated in training programs and/or received technical assistance and information from the Cornell Local Roads Program estimated their municipalities would save $1,620,000 as a direct result of their participation in training programs. Uncounted in this estimate is the additional savings that highway departments were able to realize as a result of laboratory and site test reports on pavement materials and road condition analyses provided by the Center.

The benefit-to-cost ratio is decidedly favorable. If one were to project this benefit-to-cost ratio to all municipalities in New York State — and to communities across the nation, the magnitude of the savings and the impact on upgrading our infrastructure would be significant.

Indeed, the significance of the activities of the Technology Transfer Centers merits summary reporting. The Montana Center, for example, computerized two road departments in Montana counties and helped several cities and counties start sign inventory programs. In Vermont, 13 workshops were hosted last year and a pilot grader operator training program was established. The Wyoming Technology Transfer Center maintains a technical assistance hot-line and last year responded to more than 200 calls. It also developed a basic traffic engineering workshop and maintains a transportation software lending library. In the Northwest, the Technology Transfer Center, serving Alaska, Washington and Idaho, maintains a mobile van bringing training to the field, and maintains an electronic bulletin board. Of 35 Centers reporting information on annual activities, last year nearly 400,000 newsletters containing technical information were distributed to highway officials, more than 500 workshops were held and 150 seminar presentations made.

"Infrastructure crisis" often looms on our horizon as a fiscal crisis, and indeed, it is. A significant component of the crisis, however, is not in the challenge to provide funds. It lies in the challenge to create the kind of partnership of forces — financial and human resources — that will move us forward on safe roads and bridges within the level of funding that is available. The Technology Transfer Program at Cornell attests to the fact that success in cost-savings programs rests on a partnership of adequate funding, a professional staff committed to providing the best technical information and training possible, and public works officials at the local level who are dedicated to public service and personally motivated to acqluire the technical skills and training necessary to carry out their jobs.

This information, brief as it is, is being shared with the Subcommittee on Water Resources, Transportation and Infrastructure, not as a "show and tell" exercise, but to underscore the very important role played by these Centers is bringing a progressive, cost-effective solution to the problem of infrastructure deterioration. Clearly, the solution is not to be found solely by seeking additional funding. The strains on budgets at all levels of government calls upon us to exercise special responsibility in developing programmatic solutions within the existing funding levels. Technological innovation and a mechanism to translate new developments into practice at the local level meet that responsibility.

SUMMARY REPORT OF CORNELL LOCAL ROADS PROGRAM TECHNOLOGY TRANSFER CENTER

Title: Cornell Local Roads Program
Technology Transfer Center

Agency: Department of Agriculture and Biological Engineering
Cornell University, Ithaca, New York 14853

Staff: Dr. Lynne H., Irwin, P.E., Director
Dr. Katherine Skelton, Project Coordinator
Charles Ditmars, Laboratory Technician
Daniel Speck, Computer Specialist
Deborah Donk, Project Secretary

Problem: In New York State there are 1608 local highway departments at the town, county, city and village level. Only a few of these agencies (less than 150) are headed by engineers. The vast majority of the rest of the highway departments need technical assistance and training on how to build and maintain roads, and how to manage a highway department. A high level of turnover among the personnel creates a need to continuously provide training.

Solution: In October, 1984, with the assistance of the Federal Highway Administration and the New York State Department of Transportation, an outreach program was established to provide technical assistance and training for local highway officials in New York State. Known as the Cornell Local Roads Program Technology Transfer Center, the following services are provided:

- A mailing list and directory of highway officials
- Publication of a quarterly newsletter
- Workshops and training seminars
- Information and technical assistance services

Results: Highlights of the Center's accomplishments over two years are:

- We taught 2293 students in workshops on 13 different topics in 118 locations around New York State.
- We answered more than 900 requests for technical information, and we filled 2,122 requests for publications.
- A quarterly newsletter, Nuggets and Nibbles, is distributed to more than 3000 addresses.
- Six training manuals have been published and seminars developed for highway officials. The titles include:

  Salt Management Handbook
  Powers and Duties of Local Road Officials
  Basics of a Good Road
  Pavement Maintenance and Pavement Management
  Highway Drainage
  Tort Liability and Risk Management

  Hundreds of copies of these books were distributed at the workshops and many more copies were sent upon request to highway officials.

- — We initiated a plan for a salt storage shed which received an American Society of Agricultural Engineers blue ribbon award in June 1986.
- — The program is provided at an annual cost of $125,000. According to estimates provided on 580 evaluation questionnaires which came back from the workshops, the students estimated their municipalities would save $1.620,000 as a result of the instructional program. The benefit-to-cost ratio is decidedly favorable.
- — In response to a statewide survey distributed in January 1987, the audience of highway officials nearly unanimously indicated they would like us to continue offering the program.

Available Information: In addition to the six publications cited above which our program authored, the Center distributes more than 50 publications that it stocks on a routine basis. New titles are being added continuously.

October 28, 1987

Cornell Local Roads Program
Technology Transfer Center
Evaluation Report

Summary Prepared By
Kate Skelton and Dan Speck
March 5, 1987

As part of our on-going effort to seek feedback from our audience, an Evaluation Survey was conducted by the Cornell Local Roads Program 28 months after the initiation of the Technology Transfer Center (T^2 Center). In December 1986, approximately 1800 evaluation surveys were mailed, with a cover letter, to our newsletter mailing list for New York State. This listing includes the heads of all of the local highway departments in the state as well as those who have asked to be put on our mailing list. It was requested that completed surveys be returned no later than January 30, 1987.

Since there are about 1500 highway departments in the state (there are 1608 local governments, but some small villages do not have a public works department), those municipalities that have more than one person on our mailing list would receive multiple copies of the questionnaire. The common denominator among the questionnaire recipients was the fact that each person receives the newsletter, "Nuggets and Nibbles," on a regular basis. We were attempting to obtain feedback from those people who were familiar with our program, including those who had not participated in our workshops and seminars during the previous two years. We were completely successful in achieving this objective.

A copy of the Evaluation Survey is attached. It was designed to focus on an evaluation of the effectiveness of the T^2 Center activities, including the newsletter, training, and information service, as well as a needs assessment related to these same activities. In addition, an effort was made to evaluate the "cost effectiveness" of T^2 activities in terms of dollar savings to municipalities as a result of specific programs or services the Center had provided.

The results summarized below are based on the 352 returned by January 30, 1987. Responses were received from all levels of government, but as the following table shows, the highest percentage of the total received came from towns and villages, 50 and 24 percent respectively.

The table also shows the "response rate" by type of municipality. That is, what return did we get from the 930 counties in the state, for example? When looking at this kind of "representativeness," clearly we received an excellent response from counties, even when factoring in the possibility that multiple copies of the Evaluation Survey might have gone to respondents in counties and other municipalities. Because of this differential return rate by type of municipality, much of the analysis of the data in this summary assesses responses in terms of both overall results and responses by type of municipality.

Type of Municipality	Number of Responses	Percentage of Total Received	Questionnaires Distributed*	Response Rate
Towns	178	50%	1025	17%
Villages	84	24%	505	17%
Cities	28	8%	103	27%
Counties	55	16%	164	34%
NYSDOT	7	2%	64	11%

*Because of the coding procedure we used, it was not possible to distinguish between county and NYSDOT respondents unless they chose to sign their surveys. For this reason, we believe the NYSDOT is underrepresented.

Because we did not obtain complete responses to all questions by all respondents, the analysis lacks a certain rigor in terms of measures of statistical significance or confidence levels. However, the excellent return rate and the thoroughness with which most of the surveys were completed, encourages a general "confidence" in the analysis.

Effectiveness of the newsletter

Respondents were asked to judge the usefulness of the various newsletter departments (Calendar, "Did you Know That...," Publication Abstracts, Feature Articles, Letters from Readers, and Editorials). Ninety percent of those surveyed answered this question, and 95 percent of those answering indicated that Nuggets and Nibbles had been somewhat or very useful to them. There was no significant difference in the assessments of the various newsletter departments. When looking at the usefulness of the newsletter to respondents by the type of municipality they represented (town, county, village, city, state) there were no major differences that came to light.

Forty-four respondents suggested that new features be included in Nuggets and Nibbles. The most frequently mentioned topic was liability. Some respondents from smaller municipalities asked that the newsletter include more information on roads relevant to smaller units of government.

The recipients were asked if they would like to see more, the same, or less emphasized of each of the newsletter departments. There were fewer responses to this question and most indicated they would like to see about the same emphasis given as is currently the case.

Overall, the evaluation of the newsletter is positive and it is meeting the needs of readers of all units of government.

Recommendations:

1. A column on legal issues and liability should be added.

2. Occasionally, feature material should be included which is specific to the needs of smaller units of government.

3. The "Letters from our Readers," feature should be expanded and letters encouraged. This feature might be a quarterly department, or a once-a-year special issue.

Training Sessions

Respondents were asked to indicate whether or not the 1985 and 1986 training sessions had been helpful to them in carrying out their duties. Most indicated that the sessions they had attended had been "somewhat to very helpful." However, the response rate to this question was not high as we would have hoped. More than a third of the respondents did not answer this question. This may be due to the fact that many of the people who received the Evaluation Survey had not attended the training sessions.

While this lowers our confidence in analyzing the responses to this question, it is important to bear in mind that the survey as a whole was intended to elicit responses about the Center's effectiveness from its total audience — that is, those who attend workshops, those who receive the newsletter but may or may not have participated in training, users of our information service, and both long-term highway officials who are very familiar with the Center's program as well as those who have been in office only a short time and have not yet used or become familiar with all of the varied services provided by the Center.

Forty-one percent of the respondents indicated they had attended the 1985 Highway School, and 40 percent attended the 1986 Highway School. In looking at attendance rates other than the Highway Schools or Public Works School, many of the respondents indicated they had attended several of the training sessions offered in the past two years. This provides an indirect measure of the effectiveness of the Center's training programs. After participating in one program, people chose to attend others offered by the Center.

Twenty-nine percent of the respondents indicated they had not attended any training session offered by the T^2 Center, and there was some variation in terms of the respondents' type of municipality. In addition, some within this category indicated that they were not in office at the time training sessions were offered and, therefore, could not answer the question. Forty-two percent and 71 percent of respondents from villages and cities, respectively, indicated that they had not attended training sessions, while only 18 percent and 22 percent, respectively, from counties and towns indicated they had not attended. When we look at attendance rates for training sessions other than the Highway School and Public Works School, the disparity remains but it is not nearly as great. Respondents from counties attended workshops about twice as frequently as respondents from other types of municipalities.

This difference in attendance rates may reflect the fact that county officials, for example, may have more funds available to them for training and can more easily schedule time away from their work to attend training sessions. However, the fact that there is a disparity suggests that we should focus attention on a need to develop workshops that are more audience-specific both in subject matter and format as well as in marketing procedures for the workshop.

It was important to assess not only the effectiveness of training sessions, but to understand reasons why people had not attended workshops. An attempt was made to draw out this kind of information by asking respondents to indicate reasons why they had not attended training sessions over the two year period. Of those who should have answered this question, 31 percent did not give reasons for not attending. For those who did respond, several major reasons for not attending were cited. These included the fact that for some the dates or locations of the training sessions were inconvenient. For others, the topics of training sessions were not of interest. A small number indicated that they were unable to obtain permission to attend a particular training session.

More than 20 percent of the respondents indicated that they did not know about the training session, and for the major conferences that had been sponsored (Highway Schools in 1985 and 1986, and the Public Works School), 23 to 25 percent of the respondents indicated they were unable to obtain permission to attend. In terms of type of municipality, non-attendance because permission could not be obtained was indicated more frequently by county roads officials than for officials in villages, cities, or towns.

Based upon the comments written in by some respondents, we realized after the fact that we should have provided atleast one more choice of answer to this question. It would have said, "I was not in office at the time."

Overall as stated earlier, we feel the response to this question on training sessions was not high as we would have liked. However this concern should also be tempered by the fact that the survey was sent to people who have not attended our training sessions and whose primary knowledge of our program is through receiving the newsletter. The response rate also may have been a function of the structure or complexity of the question or the fact that respondents were asked to evaluate training programs that they had attended over a two-year period. A certain degree of caution, therefore, must be used in drawing conclusions from the data. What the data suggest is that the training programs are effective, but that there are many reasons that impact on attendance rates. These include the date workshops are offered, the location where they are given, the interest or relevance of workshop topics to various audiences, and awareness of training programs being offered by the Center. Each of these factors is addressed in the recommendations.

Recommendations:

1. Training seminars should be announced with greater lead time for officials to schedule their attendance, and to obtain permission and funds to attendance. In the past we had been sending out workshop announcements four

to six weeks in advance of the first scheduled date. We plan to increase the lead time to eight weeks whenever that is possible.

2. The seminars and workshops need to be marketed more aggressively. For example, second "reminder" notices should be sent, a cover letter should be sent with announcements asking the recipient to post the announcement and call it to the attention of appropriate employees in his or her department. Additional flyers could be made available to those requesting them.

3. Efforts to advertise our training seminars and workshops through networking should be expanded. For example, we should invite members of our steering committee, cooperative extension staff, APWA chapters, and local associations of highway officials to assist with the publicity and to send to their contacts, where appropriate, copies of our flyers with a personal cover letter encouraging them to attend.

4. Some seminars could be developed that are specific to the needs of different classes of municipalities.

Effectiveness of Information Service

The response rate on this question was 97 percent. The information and publication service offered by the T^2 Center has been utilized by 48 percent of the respondents, and 96 percent of those indicated they had received a timely response to their request. Moreover, 35 percent of the respondents had requested information from another source for which the T^2 Center had provided referral, and 96 percent found that the response to these requests had been timely.

It is clear from this question that the Center, as an information service, is meeting a real need. Secondly, we are meeting that need very efficiently. There are no recommendations to change the information service at this time.

Best Time of Year to Hold Training Sessions

Based upon guidance that was received at the onset of the T^2 Center project, training sessions have been offered mainly during the summer months, with some workshops being offered in late spring or early fall. Responses to the question on the best time of year for training sessions elicited important information, both overall, and by type of municipality. Implications for planning training activities are discussed in the section on Recommendations.

Overall, the best months for training were the spring and early fall months. In looking at preferences by type of municipality, respondents selected the following months as the best time for training sessions to be held (listed in order of priority):

Towns
May (47%)
June (44%)
April (43%)
October (37%)
September (35%)

Villages
September (40%)
October (37%)
April (37%)
March (32%)

Counties
April (56%)
March (55%)
February (45%)
October (45%)
May (40%)

Cities
March (57%)
November (57%)
April (46%)
February (43%)
October (39%)

These different preferences by type of municipality have important implications for planning of training sessions. If towns prefer training sessions in the spring, for example, and a workshop is designed for officials in those types of governmental units, the date the workshop is offered will affect attendance. Ninety-five percent of the respondents answered this question.

Of course, we will want to avoid schedule conflicts with other major statewide events that involve local roads officials. For instance, in late April there is the APWA meeting, the Highway School in June, the county superintendents' meeting in August, the town superintendents' meeting in September, and the Public Works School in October. Given that our training sessions are generally only one day in length, and they usually do not involve long-distance travel and overnight lodging, we feel that the potential for conflict with the statewide meetings is minimal, as long as we do not schedule workshops in the same calendar week as the other meetings.

Best Length For Training Sessions

Respondents also were asked what the best training session length was, and 77 percent indicated that the one day sessions are just right. Typically, a one-day session has run about six hours long, including a morning coffee break and an hour for lunch. There was some difference found when looking at responses to this question by type of municipality. The breakdown is as follows

	Cities	Counties	Towns	Villages
One-day sesions are:				
Just right	85%	82%	76%	75%
Too long	0%	2%	13%	15%
Too short	4%	9%	5%	4%
No preference	11%	7%	6%	6%

Recommendations

1. More seminars need to be offered in the spring and fall months.

2. In scheduling, greater attention should be paid to matching the stated preference for best time of the year for training with the particular audience for which a workshop is intended.

3. It is apparent that the preferred workshop length for repondents from towns and villages suggests that, while the majority feel the workshop length is just right, a small but perhaps significant minority feel workshops are too long. Where possible, some half-day workshops where towns and villages are the primary audience might be held on a trial basis in the coming year. Caution should be used to avoid overreaction on this point, since those who indicated the past workshops were too long were outnumbered by five to one by those who felt they were just the right length.

Topics for Future Workshops

From a list of 18 possible workshop subject areas, respondents selected those in which they had an interest and also ranked the three areas that were of greatest importance to them in the coming year. Workshops selected most frequently, for the entire sample, with the percentage of respondents indicating these topics are as follows:

Pavement Maintenance	64%
Drainage	62%
Construction of Roads	58%
Legal Aspects	56%
Highway Safety	50%

Only 2 percent of respondents chose not to answer this question. The high response rate to this question is important in terms of proceeding with confidence in planning for future workshops. Additionally it reflects a high degree of awareness on the part of respondents for a need for training in specific areas.

Respondents were asked to rank order their first three preferences for training in the coming year. Close to 90 percent provided this rank ordering of training preferences and, in addition, 112 respondents listed specific training needs they would like to see the T^2 Center provide.

The breakdown by type of municipality reveals important differences. The following lists, by municipality and in rank order, those subject areas that were selected by 50 percent or more of the respondents:

Towns
Construction of Roads (66%)
Pavement Maintenance (63%)
Legal Aspects (60%)
Drainage (60%)

Villages
Pavement Maintenance (68%)
Drainage (64%)
Equipment Maintenance (54%)
Construction of Roads (52%)
Work-Zone Safety (51%)

Counties
Drainage (71%)
Legal Aspects (65%)
Pavement Maintenance (56%)
Highway Safety (55%)
Work-Zone Safety (55%)
Bridges (53%)
Construction of Roads (53%)
Geometric Design of Roads (53%)

Cities
Pavement Maintenance (64%)
Pavement Design (57%)
Drainage (57%)
Personnel Management (57%)
Work-Zone Safety (54%)
Equipment Maintenance (50%)
Materials and Aggregates(50%)

With respect to those respondents who listed specific training needs, many of the suggestions would normally be covered under one of the 18 general subject areas listed in the question. For example, one respondent wanted training specifically on the question of whether bridges built 10-20 years ago are safe today, another wanted to know more about deductibles written into municipal insurance. The first subject might be included in a workshop on Bridges, while the question of municipal insurance might be included in a workshop on Liability. Rather than list all suggestions, it is recommended that workshop leaders be provided with this listing so they can incorporate some of the concerns into their workshop sessions.

Recommendations:

1. Workshop leaders should be provided with a copy of the survey responses on suggestions for future training and critical job issues so that they can incorporate, when appropriate, these concerns into the workshop agendas.

2. The priority topic interests identified through the responses to this question should be reviewed by the T^2 Center Steering Committee. The information should be used for planning of training programs for the next several years.

Cost Effectiveness

The assessment of the T^2 Center's activities included efforts to measure the cost effectiveness of programs. To this end, those surveyed were asked to indicate how much money the T^2 Center programs had saved their municipalities in the past year, and if money had been saved, to indicate the specific training or information responsible for that savings.

Overall, as reported by the 106 who provided a dollar amount, the taxpayers in New York State have realized a savings of $1,620,830. Of those answering the question, 79 percent also provided an example of how T^2 Center programs had enabled them to save the specific amount they cited.

The breakdown by type of municipality in terms of the estimated savings is as follows:

	Total Saved
Towns	$452,830
Villages	150,500
Cities	72,000
Counties	945,500

Clearly the data suggest an appreciable amount of money is saved as a result of the T^2 activities at all levels of government.

Some of the general reasons for cost savings include information on salt storage, the welding workshop, and Highway School programs. Pavement maintenance, proper road construction, and liability reduction were cited by many respondents. It is noteworthy that many of the respondents provided very concrete examples to substantiate their stated savings. For example, the use of cold-mix at $22 a ton as against hot-mix pavement at $28 a ton saved one municipality $15,180. Another respondent cited the example of saving $5,000 after being introduced to chip sealing with gravel, with the result that the town used that rather than limestone and saved more than $1.00 per ton.

This question was an important follow-up to the evaluations that are completed by participants at the conclusion of workshops. In the case of workshop appraisals, participants are asked to estimate the potential savings to their municipalities as a result of their attending the workshop, while this questionnaire asked for an assessment of actual savings.

In sum, not only is the program effective in terms of financial savings, but a large number of respondents attribute the savings to specific resources and training available to them from the T^2 Center.

Should We Continue?

If T^2 Center programs have saved municipalities $1,620,000 and more than 90 percent of the respondents would like to see the Center offer training programs on specific projects in the coming year, should we continue? It is not surprising that this question was answered by nearly 90 percent of the respondents, and all but one respondent indicated that the program should continue. Between three and six percent of the respondents, depending on type of municipality, indicated they would like to see the Center continue but with changes. The changes included more on-the-job-experienced people running the training sessions, longer sessions, shorter sessions, and workshops located closer to home rather than on a regional basis.

Most Critical Job Issue

A high response, 80 percent, was received to the question regarding the most critical job issue. There are two general comments that need to be made. First, many of the items cited in response to this question were reiterations of issues raised by the respondent in other sections of the survey. Liability, pavement maintenance concerns, and drainage were frequently listed in this section. This question on the survey allowed respondents to expand on the scope of these concerns in an open-ended manner, which some chose to do. For example, a respondent from one of the towns indicated his most critical job issue was "development and water run-off -- as more shopping malls and other developments are built, more water is funneled to central locations calling for larger culverts and bridges."

Second, it is significant to note that many respondents from all levels of government indicated that the most critical job issue was, in terms of the purview of the T^2 Center, non-technical in nature. Specifically, concerns about personnel management, prioritization as an administrative responsibility, communications and public relations, and productivity were cited.

These kinds of critical needs articulated by highway officials pose a challenge to the T^2 Center. What kinds of non-technical information do we provide, what are the parameters of the mandate to T^2 Centers to provide technical information and services, and what is the proper balance between technical and non-technical needs that we are prepared to address. These are issues that the Steering Committee might wish to discuss.

To provide some historical perspective to the subject of critical job issues and the program and training priorities that the T^2 Center might want to develop, a 1983 report prepared by Lynne Irwin, sets forth the critical concerns as they were analyzed in 1981 and 1982 in two separate but similar surveys of the American Road and Transportation Builders Association and the readers of Nuggets and Nibbles. Separating out the perennial problem of finances which appears to have an eternally guaranteed top spot on the list of concerns, the critical issues then were public relations and communications, materials and pavements, bureaucracy and "red tape," manpower, management, safety, liability, traffic, maintenance, and equipment. Many of these critical issues remain, although the relative rankings have changed. Liability has become a public issue of greater concern today than it was five years ago. Then, as now, administrative concerns rather than "technical" ones were priority issues. Also, then, as now, the challenge was to provide "assistance to local roads officials, and to have a clear view of problems so that we can set our priorities accordingly." The challenge remains.

Summary of Recommendations

Newsletter

1. Add a column on legal issues and liability.

2. Feature material specific to smaller units of government.

3. Expand the column, "Letters from our Readers."

Training Sessions

1. Provide more advance notice.

2. "Market" the workshops more effectively through reminder notices, use of networking to advertise workshops, and greater attention to location, timing, and topic for particular audiences, etc.

3. Use input from survey creatively to improve effectiveness of training. For example, provide the workshop leaders with a copy of the survey responses on critical job issues and suggestions for future training so that they can incorporate, when appropriate, some of the concerns raised in this survey.

4. Develop a new list of priority training topics based upon the responses received to the Evaluation Survey.

General

1. Develop multi-faceted approaches to selected issues. For example, we might want to create a comprehensive newsletter/training session/information service "package" on liability questions.

2. Review the balance between technical and non-technical or administrative concerns as articulated by our audience with an eye to providing services that are appropriate in both areas.

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STATEMENT OF

PEGGY ANN REICHERT

on behalf of the

AMERICAN PLANNING ASSOCIATION

BEFORE A HEARING OF THE

SUBCOMMITTEE ON WATER RESOURCES,
TRANSPORTATION AND INFRASTRUCTURE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

U.S. SENATE

on

IMPROVING INFRASTRUCTURE DECISION-MAKING AT THE STATE AND LOCAL LEVELS THROUGH CAPITAL IMPROVEMENTS PROGRAMMING

November 4, 1987

MR. CHAIRMAN AND MEMBERS OF THE SENATE SUBCOMMITTEE ON WATER RESOURCES, TRANSPORTATION AND INFRASTRUCTURE:

MY NAME IS PEGGY ANN REICHERT. I AM THE DEPUTY DIRECTOR FOR PLANNING OF THE DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT FOR THE CITY OF SAINT PAUL, MINNESOTA.

I WAS APPOINTED BY MAYOR GEORGE LATIMER TO HEAD THE PLANNING DIVISION. IN THIS CAPACITY I AM RESPONSIBLE FOR THE CITY'S LONG-RANGE COMPREHENSIVE PLAN, ZONING, LAND USE, HOUSING, TRANSPORTATION, ENVIRONMENT, HISTORIC PRESERVATION AND OTHER FUNCTIONAL AREAS AND RELATED PROJECT PLANS.

OF SIGNIFICANCE TO THE PURPOSE OF THESE HEARINGS, IS MY RESPONSIBILITY FOR THE CITY'S CAPITAL PROGRAMMING. THIS CONSISTS OF A CAPITAL ALLOCATION POLICY, A FIVE-YEAR CAPITAL IMPROVEMENTS PROGRAM AND PARTICIPATION IN PREPARING AN ANNUAL CAPITAL BUDGET. TOGETHER, THESE DOCUMENTS FORM THE BASIS FOR CAPITAL EXPENDITURES IN THE CITY OF SAINT PAUL.

TODAY, I AM TESTIFYING ON BEHALF OF THE AMERICAN PLANNING ASSOCIATION (APA) OF WHICH I AM A MEMBER. I RESPECTFULLY REQUEST THAT THE COMPLETE TEXT OF MY PREPARED STATEMENT BE INCLUDED IN THE HEARING RECORD.

THE AMERICAN PLANNING ASSOCIATION IS A NATIONAL ORGANIZATION OF 21,000 MEMBERS, INCLUDING PUBLIC AND PRIVATE

PLANNERS AND ELECTED AND APPOINTED OFFICIALS AT ALL LEVELS OF GOVERNMENT AS WELL AS EDUCATORS, STUDENTS AND INTERESTED CITIZENS. OUR MEMBERS BELONG TO 45 CHAPTERS COVERING EVERY STATE AND CONGRESSIONAL DISTRICT.

APA WAS FORMED IN 1978 WHEN THE AMERICAN INSTITUTE OF PLANNERS, ESTABLISHED IN 1917, AND THE AMERICAN SOCIETY OF PLANNING OFFICIALS, FOUNDED IN 1934, WERE CONSOLIDATED. THE ASSOCIATION'S PRIMARY OBJECTIVE IS TO ADVANCE THE ART AND SCIENCE OF PLANNING FOR THE IMPROVED DEVELOPMENT OF THE NATION AND ITS COMMUNITIES, STATES AND REGIONS. WITHIN APA IS THE AMERICAN INSTITUTE OF CERTIFIED PLANNERS (AICP) WHICH FOCUSES ON PROFESSIONAL DEVELOPMENT. MEMBERS OF AICP ARE DISTINGUISHED BY HAVING MET EXPERIENCE REQUIREMENTS AND HAVING PASSED AN EXAMINATION ON PLANNING PRINCIPLES AND PRACTICES.

THE AMERICAN PLANNING ASSOCIATION HAS A MAJOR INTEREST IN CAPITAL IMPROVEMENTS PROGRAMMING AND BUDGETING. MANY OF THE ASSOCIATION'S 21,000 MEMBERS -- PROFESSIONAL STAFF OF MUNICIPAL AND COUNTY PLANNING OFFICES, MEMBERS OF PLANNING COMMISSIONS, CITY COUNCILS AND OTHER PUBLIC BODIES CONCERNED WITH PLANNING -- ARE DIRECTLY INVOLVED IN CAPITAL IMPROVEMENT PROGRAMMING AND CAPITAL BUDGETING. OUR MEMBERSHIP ALSO INCLUDES PLANNING STAFF FOR AGENCIES SUCH AS WATER UTILITIES AND SEWER DISTRICTS AND STAFF OF SUCH STATE AGENCIES AS OFFICES OF PLANNING AND BUDGET, DEPARTMENTS OF

TRANSPORTATION AND ENVIRONMENTAL PROTECTION AGENCIES. WHEREVER HE OR SHE WORKS, SOME OF THE CENTRAL FUNCTIONS OF THE PLANNING OFFICIAL AND THE PROFESSIONAL PLANNER ARE TO ASSESS THE CURRENT CONDITIONS OF PUBLIC FACILITIES FOR MEETING LONG-TERM NEEDS; TO ANALYZE THE COST AND BENEFITS OF VARIOUS ALTERNATIVES FOR MEETING ANY IDENTIFIED NEEDS; AND THEN TO MAKE RECOMMENDATIONS TO ELECTED OFFICIALS ON HOW NEEDED CAPITAL INVESTMENTS SHOULD BE SCHEDULED AND FINANCED.

I HAVE TWO PURPOSES IN TESTIFYING TODAY.

ONE IS TO SHARE WITH THE SUBCOMMITTEE THE TYPES OF BENEFITS THAT SAINT PAUL AND OTHER COMMUNITIES, AS WELL AS STATES, DERIVE FROM THE USE OF CAPITAL IMPROVEMENTS PROGRAMMING (CIP).

MY SECOND PURPOSE IS TO RECOMMEND, ON BEHALF OF THE AMERICAN PLANNING ASSOCIATION, THAT THE CONGRESS ENCOURAGE THE STATE AND LOCAL USE OF CAPITAL IMPROVEMENTS PROGRAMMING AS A BASIS FOR DECISIONS ON INFRASTRUCTURE.

A. FIRST, LET ME ADDRESS THE BENEFITS OF CIPs THROUGH OUR EXPERIENCE IN SAINT PAUL.

1. ORIGINS OF CAPITAL PROGRAMMING IN SAINT PAUL

SAINT PAUL IS A MEDIUM-SIZED CITY WITH A 1987 POPULATION OF 265,000. THE 1987 CAPITAL IMPROVEMENT BUDGET TOTALED $50 MILLION. THE BUDGETS FOR THE PAST EIGHT YEARS HAVE RANGED FROM $27 TO $64.5 MILLION FOR AN AVERAGE ANNUAL LEVEL OF $40.6 MILLION. SAINT PAUL RELIES ON A WIDE RANGE OF SOURCES TO FUND ITS CAPITAL IMPROVEMENTS.. THESE INCLUDE GENERAL OBLIGATION BONDING, SPECIAL ASSESSMENTS AND STATE AND FEDERAL GRANTS AND AID.

IN SAINT PAUL, WE HAVE BEEN INVOLVED IN A CAPITAL PROGRAMMING AND BUDGETING PROCESS WHICH INCLUDES OUR CITIZENS, ELECTED OFFICIALS AND PROFESSIONAL STAFF FOR TWENTY YEARS NOW. WE DEVELOPED CAPITAL PROGRAMMING AND BUDGETING AS A SOLUTION TO A PARTICULAR PROBLEM. PRIOR TO 1967, SAINT PAUL, LIKE MANY CITIES, FUNDED ITS CAPITAL PROJECTS ON A PIECEMEAL BASIS BY GOING TO THE VOTERS ON ONE MAIN BOND ISSUE REFERENDUM EVERY DECADE OR SO. TO GAIN APPROVAL OF THE REFERENDUM, THE CITY OFTEN HAD TO INCLUDE PROJECTS BASED ON VOTER APPEAL RATHER THAN CLEAR NEED.

IN 1967 A GROUP OF CITIZENS AND CITY GOVERNMENT OFFICIALS DECIDED THE BUDGETING PROCESS NEEDED TO BE MORE RATIONAL. THEY APPROACHED THE MINNESOTA LEGISLATURE FOR ASSISTANCE. NEW LEGISLATION AUTHORIZED SAINT PAUL TO DEVELOP A CAPITAL IMPROVEMENT BUDGET TO BE FUNDED ANNUALLY BY A SET AMOUNT

OF GENERAL OBLIGATION BONDS WITHOUT VOTER REFERENDA. TO PROVIDE PUBLIC OVERSIGHT TO THIS SYSTEM, THE CITY WAS REQUIRED TO ESTABLISH A LONG-RANGE CAPITAL IMPROVEMENT BUDGET (CIB) COMMITTEE MADE UP OF CITIZENS WHOSE RESPONSIBILITY WAS TO RECOMMEND AN ANNUAL CAPITAL BUDGET AND PROGRAM TO THE MAYOR AND CITY COUNCIL. THE COMMITTEE WAS TO PROVIDE A RATIONAL METHOD OF INCLUDING CITIZEN INPUT INTO THE PROCESS OF ALLOCATING CAPITAL FUNDS FROM BONDS NOT SUBJECT TO REFERENDA.

OVER THE PAST TWENTY YEARS, WE HAVE CONTINUED TO REFINE THE CAPITAL BUDGETING PROCESS IN RESPONSE TO NEW PROBLEMS AND OPPORTUNITIES. FOR EXAMPLE, WE REALIZED THE NEED FOR OUR CAPITAL INVESTMENT DECISIONS TO RELATE MORE CLOSELY TO OUR CITY DEVELOPMENT PLANS. SO WE ASKED THE CITY'S PLANNING COMMISSION TO DEVELOP A CAPITAL ALLOCATION POLICY AS A SHORT TERM STRATEGY DOCUMENT TO LINK THE ANNUAL BUDGET WITH THE CITY'S COMPREHENSIVE PLAN.

WE ALSO RECOGNIZED THE NEED TO MAKE BUDGET DECISIONS ON ALL CAPITAL FUND SOURCES AT THE SAME TIME SO WE EXPANDED THE SCOPE OF OUR PROCESS TO INCLUDE NOT ONLY GENERAL OBLIGATION BONDS, BUT COMMUNITY DEVELOPMENT BLOCK GRANTS, SPECIAL TAX LEVIES, AND STATE AND FEDERAL AID.

WE SAW THE NEED TO PLAN OUR CAPITAL INVESTMENTS ON MORE THAN A YEAR-TO-YEAR BASIS AT THE SAME TIME THAT A NEW STATE

LAW REQUIRED MUNICIPAL CAPITAL PLANNING, AND WE ASKED EACH DEPARTMENT TO PREPARE 5-YEAR CAPITAL PROGRAMS.

FINALLY, THE ROLES OF VARIOUS PARTICIPANTS IN THE DECISION-MAKING, FROM NEIGHBORHOOD GROUPS TO THE MAYOR AND CITY COUNCIL, WERE ALSO REFINED AND CLARIFIED OVER THE YEARS.

2. CAPITAL PROGRAMMING AND BUDGETING IN SAINT PAUL TODAY

TODAY, THE CAPITAL INVESTMENT DECISIONS IN SAINT PAUL ARE MADE THROUGH THE DEVELOPMENT OF THREE KEY DOCUMENTS: THE CAPITAL ALLOCATION POLICY, THE 5-YEAR CAPITAL IMPROVEMENT PROGRAM AND THE ANNUAL CAPITAL BUDGET.

THE CAPITAL ALLOCATION POLICY IS A SET OF POLICY STATEMENTS GUIDING HOW THE CITY SHOULD ALLOCATE ITS CAPITAL FUNDS. IT IS PREPARED EVERY TWO YEARS BY THE CITY'S PLANNING COMMISSION WITH INPUT FROM CITIZENS AND STAFF, AND ADOPTED BY THE CITY COUNCIL. THE POLICIES ARE QUITE COMPREHENSIVE, ADDRESSING ISSUES SUCH AS OVERALL DEBT LIMITATIONS, GUIDELINES FOR THE USE OF VARIOUS TYPES OF FUNDS, IDENTIFICATION OF PRIORITY AREAS FOR INVESTMENT, MINIMUM OR NECESSARY REQUIREMENTS FOR INDIVIDUAL PROJECTS (E.G., RETURN ON INVESTMENT) AND EVEN CLEAR PROHIBITIONS ON SOME TYPES OF PROJECTS.

THE 5-YEAR CAPITAL IMPROVEMENT PROGRAM (CIP) IS AN ITEMIZED LISTING OF CAPITAL PROJECTS TO BE UNDERTAKEN OVER THE NEXT

FIVE YEARS. EACH CITY DEPARTMENT, TOGETHER WITH THE PLANNING COMMISSION, DEVELOPS A 5-YEAR CAPITAL INVESTMENT PLAN FOR ITS FUNCTIONAL AREAS OF RESPONSIBILITY, IDENTIFYING TIMING, COST, FUND SOURCES, AND COORDINATION NEEDS OF EACH PROPOSED PROJECT. AS PART OF THE 5-YEAR PROGRAM, EACH DEPARTMENT MUST EXPLAIN THE OVERALL INVESTMENT STRATEGY PROPOSED TO MANAGE THAT FUNCTION. THE CAPITAL PROGRAM ADOPTED BY THE CITY COUNCIL THEN BECOMES A TENTATIVE SCHEDULE FOR FUTURE CAPITAL PROJECTS BUT ACTUAL COMMITMENTS ARE NOT MADE UNTIL THE ANNUAL BUDGET. THEREFORE, THE CAPITAL IMPROVEMENT PROGRAM IS A FLEXIBLE PLANNING TOOL AND PROVIDES IMPORTANT INFORMATION ABOUT THE CITY'S INTENTIONS THAT CAN BE SHARED AMONG ALL CITY DEPARTMENTS, NEIGHBORHOOD GROUPS, THE PRIVATE SECTOR, UTILITIES AND OTHER GOVERNMENTAL UNITS.

THE ANNUAL CAPITAL BUDGET REPRESENTS THE ACTUAL COMMITMENT OF FUNDS TO INDIVIDUAL PROJECTS. THE DECISION-MAKING PROCESS IN SAINT PAUL IS STRONG BECAUSE OF ITS EXTENSIVE CITIZEN INVOLVEMENT. THIS PROCESS INVOLVES THE FOLLOWING STEPS:

a. CITY DEPARTMENTS SUBMIT PROPOSALS FOR THE BUDGET. THESE PROPOSALS ARE GENERALLY DERIVED FROM YEAR 1 OF THE 5-YEAR CAPITAL PROGRAM ADOPTED PRIOR TO INITIATION OF THE ANNUAL BUDGETING PROCESS. HOWEVER, NEW PROJECTS NOT IDENTIFIED IN THE CIP MAY BE PROPOSED.

b. NEIGHBORHOOD GROUPS ARE ALSO INVITED TO SUBMIT PROPOSALS FOR CONSIDERATION AND TO REVIEW AND RECOMMEND CHANGES TO CITY DEPARTMENT PROPOSALS.

c. AFTER PRELIMINARY REVIEW AND REFINEMENT, THE PROPOSALS ARE REVIEWED BY ONE OF THREE CITIZEN TASK FORCES: STREETS AND UTILITIES, COMMUNITY FACILITIES, AND RESIDENTIAL AND ECONOMIC DEVELOPMENT. EACH TASK FORCE USES A 100 POINT PROJECT RATING SYSTEM BASED PRIMARILY ON OBJECTIVE CRITERIA SET FORTH IN THE CAPITAL ALLOCATION POLICY, HOWEVER, TASK FORCE MEMBERS, THE PLANNING COMMISSION, CITY DEPARTMENTS , AND THE CITY'S 17 NEIGHBORHOOD DISTRICT PLANNING COUNCILS MAY ALLOCATE UP TO 10 POINTS EACH TO THEIR OWN PRIORITY PROJECTS. PROJECT CONFORMANCE WITH THE CITY'S COMPREHENSIVE PLAN, CAPITAL ALLOCATION POLICY, AND CAPITAL IMPROVEMENT PROGRAM, WHILE NOT ABSOLUTELY REQUIRED, IS STRONGLY ENCOURAGED BY THE REWARD OF POINTS IN THE RATING.

d. THE CIB COMMITTEE REVIEWS THE RECOMMENDATIONS OF THE TASK FORCES AND DEVELOPS A COORDINATED RECOMMENDATION ON WHICH PROJECTS SHOULD BE FUNDED IN THE ANNUAL BUDGET. THEY ALSO IDENTIFY FUND SOURCES FOR EACH RECOMMENDED PROJECT AND ANY PROJECT COORDINATION ACTIVITY NEEDED.

e. THE MAYOR REVIEWS THE CIB COMMITTEE'S RECOMMENDED CAPITAL BUDGET, MAKES ADJUSTMENTS, IF ANY, AND SENDS IT TO THE CITY COUNCIL.

f. THE CITY COUNCIL REVIEWS THE DOCUMENT, MAKES CHANGES IT DEEMS NECESSARY AND ADOPTS THE BUDGET.

GIVEN THE LENGTHY REVIEW PROCESS INVOLVED, WE HAVE RECENTLY ADOPTED A BIENNIAL BUDGETING CYCLE. THE CAPITAL BUDGET IS LAID OUT FOR TWO YEARS ALTHOUGH FORMALLY ADOPTED ON AN ANNUAL BASIS. ONLY MINOR ADJUSTMENTS ARE MADE TO THE ANNUAL BUDGET DURING THE SECOND YEAR OF THE CYCLE.

3. BENEFITS OF CAPITAL PROGRAMMING AND BUDGETING

THE BENEFITS OF OUR CAPITAL PROGRAMMING AND BUDGETING PROCESS ARE BOTH FINANCIAL AND POLITICAL.

a. ON A FINANCIAL LEVEL, CAPITAL PROGRAMMING AND BUDGETING HAS SAVED US MONEY IN MANY WAYS.

- BY PLANNING AHEAD, WE CAN COORDINATE AMONG FUNCTIONAL AREAS, WITH OTHER UTILITIES AND PRIVATE DEVELOPMENT, AND WITH OTHER GOVERNMENTAL UNITS. WE NOW ONLY DIG UP A STREET ONCE TO PUT IN NEW SEWER, WATER, GAS, AND CABLE

TELEVISION. AND WE PUT NEW CURB AND PAVEMENT ON THE STREET AFTER WE DO THE UNDERGROUND WORK. THIS SAVES EVERYONE TIME AND MONEY AND REDUCES INCONVENIENCE. SUCH COORDINATION REQUIRES MORE THAN SIMPLY SCHEDULING BECAUSE FUNDS FOR VARIOUS TYPES OF PROJECTS OFTEN MUST BE SPENT IN PREDETERMINED YEARS.

- THROUGH CAPITAL PROGRAMMING, WE ALSO REDUCED THE IMPACT OF OVERLAPPING TAXING JURISDICTIONS ON THE SAINT PAUL TAX BASE. AS THE CITY, COUNTY, AND SCHOOL DISTRICT HAVE COORDINATED CAPITAL SPENDING PLANS AND BOND ISSUES, WE HAVE SUCCESSFULLY REDUCED OUR JOINT IMPACT ON THE TAXPAYER FROM A 1977 LEVEL OF MORE THAN 9 PERCENT OF ESTIMATED MARKET VALUE TO A PROJECTED 3.5 PERCENT BY 1992.

- SHARING OUR PLANS FOR CAPITAL IMPROVEMENTS EARLY WITH OUR NEIGHBORHOODS HAS OPENED OPPORTUNITIES TO LEVERAGE OUR PUBLIC DOLLARS. FOR EXAMPLE, WHEN ONE OF OUR NEIGHBORHOOD BUSINESS GROUPS LEARNED OF CITY PLANS TO REBUILD THEIR STREET, THEY GOT TOGETHER AND DECIDED TO IMPROVE THE SIDEWALKS AND STREET LIGHTS. THE CITY CONTRIBUTED 10 PERCENT OF THE ADDITIONAL COST; THE BUSINESS OWNERS ASSESSED THEMSELVES FOR THE REMAINDER.

- BY PLANNING AHEAD, WE CAN AVOID COSTLY CRISIS MANAGEMENT. ONCE THE ROOF CAVES IN, IT IS DIFFICULT TO AVOID SIMPLY REPLACING IT. WITH MORE LEAD TIME, WE HAVE

THE OPTION OF ASKING WHETHER THIS FACILITY IS REALLY NEEDED, AND TO ASSESS OTHER, PERHAPS MORE COST-EFFECTIVE, ALTERNATIVES. OUR FIRE DEPARTMENT PROPOSED TO REPLACE THE ROOFS ON ALL THEIR STATIONS OVER A 5 YEAR PERIOD. THIS HAS LED US TO EXAMINE WHETHER WE EVEN NEED ALL THOSE STATIONS OR SHOULD CONSOLIDATE AND PERHAPS MODERNIZE THE SYSTEM.

- CAPITAL PROGRAMMING AND BUDGETING ALSO PROVIDES AN OPPORTUNITY TO AVOID FINANCIAL DISASTERS -- WITH EVERYTHING FALLING APART AT THE SAME TIME. BY PLANNING AHEAD, PROJECTS CAN BE SCHEDULED OVER TIME AND NEW SOURCES OF FUNDING EXPLORED. OUR CAPITAL PROGRAMMING EFFORTS EDUCATED THE COMMUNITY ON THE SCOPE OF OUR OWN INFRASTRUCTURE NEEDS, RESULTING IN MUCH STRONGER SUPPORT TO INCREASE RELIANCE ON SPECIAL ASSESSMENTS AS A FUNDING SOURCE.

- CAPITAL PROGRAMMING AND BUDGETING HAS ENABLED SAINT PAUL TO DEMONSTRATE TO THE BOND RATING AGENCIES THAT WE ARE MANAGING OUR CAPITAL ASSETS WITH CARE. WE HAVE IMPROVED OUR BOND RATING OVER THE PAST DECADE, SAVING US CONSIDERABLE MONEY IN DEBT SERVICE.

b. ON A POLITICAL LEVEL, THE MOST OBVIOUS BENEFIT OF OUR CAPITAL PROGRAMMING AND BUDGETING PROCESS IS THE EXCEPTIONAL DEGREE OF CONCENSUS ON THE FINAL BUDGET THAT

RESULTS -- AS WITNESSED BY THE FACT THAT THE MAYOR AND CITY COUNCIL HAVE NEVER MADE MORE THAN MINOR REVISIONS IN THE BUDGET RECOMMENDED BY THE CIB COMMITTEE. EVERYONE IS PLEASED WITH THE PROCESS BECAUSE HE OR SHE HAS THE OPPORTUNITY TO EXERCISE A LEGITIMATE ROLE.

THE PROFESSIONAL STAFF IS PLEASED BECAUSE THEY GET A CHANCE TO EXPLAIN THEIR TECHNICAL VIEWS ON THE CAPITAL NEEDS OF THIS CITY TO A WILLING AUDIENCE, AND AN AUDIENCE THAT IS VESTED WITH SOME INFLUENCE OVER THE DECISION-MAKING PROCESS. THE CITIZENS IN OUR NEIGHBORHOODS AND DOWNTOWN ARE PLEASED WITH THE PROCESS BECAUSE THEY HAVE AN OPPORTUNITY TO BOTH REVIEW AND QUESTION THE RECOMMENDATIONS OF CITY STAFF AS WELL AS TO PUT FORWARD PROJECTS OF THEIR OWN. THE ELECTED OFFICIALS ARE PARTICULARLY PLEASED WITH THE PROCESS BECAUSE THE DECISIONS ARE BOTH RATIONAL, ECONOMICAL, AND PUBLICLY SUPPORTED. THIS MAKES THE JOB EASIER FOR THE ELECTED OFFICIAL, WHO IS OFTEN CAUGHT BETWEEN TECHNICAL ARGUMENTS ON THE ONE HAND AND THE PUBLIC'S OBJECTIVES ON THE OTHER.

OUR CAPITAL PROGRAMMING AND BUDGETING PROCESS HAS IMPROVED THE QUALITY OF OUR INVESTMENT DECISIONS. THE PROCESS IS ROOTED IN OPEN COMPETITION. NO PROJECT SURVIVES THE RIGOROUS PUBLIC SCRUTINY AND EVALUATION WITHOUT A SOLID RATIONALE FOR ITS NEED AND ITS PRIORITY.

FINALLY, OUR CAPITAL PROGRAMMING AND BUDGETING PROCESS HAS IMPROVED THE QUALITY OF POLITICS IN SAINT PAUL. MAKING DECISIONS ON CAPITAL INVESTMENTS IS NOT A SCIENTIFICALLY RATIONAL PROCESS. SUCH DECISION-MAKING IS THE VERY ESSENCE OF POLITICS -- IN THE BEST SENSE OF THE WORD. THE QUESTION IS HOW TO ALLOCATE VERY SCARCE RESOURCES AMONG COMPETING DEMANDS. CONFLICTS ARISE IN THIS PROCESS BECAUSE DIFFERENT INDIVIDUALS AND DIFFERENT GROUPS PLACE DIFFERENT VALUES ON VARIOUS OPTIONS. A GOOD CAPITAL PROGRAMMING PROCESS IN A COMMUNITY, HOWEVER, CAN PROVIDE A SETTING IN WHICH TO MANAGE THESE INEVITABLE CONFLICTS BY INVOLVING EVERYONE IN THE PROCESS, PROVIDING ADEQUATE INFORMATION AND THE OPPORTUNITY TO EXPRESS ONE'S VIEW AND HEAR THOSE OF OTHERS. CAPITAL PROGRAMMING PROVIDES AN OPPORTUNITY FOR ORGANIZING AND MAKING THOUGHTFUL THIS DIFFICULT POLITICAL PROCESS OF CHOOSING AMONG OPTIONS FOR SPENDING LIMITED DOLLARS.

4. PREVALENCE OF STATE AND LOCAL CIPs

THE EXPERIENCE WITH CAPITAL IMPROVEMENTS PROGRAMMING THAT I HAVE JUST DESCRIBED IS NOT UNIQUE TO SAINT PAUL. MANY OTHER LOCALITIES HAVE EXPERIENCED THE BENEFITS OF PLANNING AND CAPITAL IMPROVEMENTS PROGRAMMING.

AT THIS POINT, MR. CHAIRMAN, I WOULD LIKE TO INTRODUCE FOR THE RECORD ACTUAL QUOTATIONS FROM INFRASTRUCTURE HEARINGS

HELD BETWEEN APRIL 26,1985 AND FEBRUARY 22, 1986 BY THE HOUSE COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION. THESE QUOTATIONS FROM LOCAL AND STATE OFFICIALS DEMONSTRATE THE IMPORTANCE THAT THEY PLACE ON CAPITAL IMPROVEMENTS PLANNING AND PROGRAMMING.

THE PERCENTAGE OF LOCAL GOVERNMENTS FOUND TO HAVE MULTI-YEAR CAPITAL IMPROVEMENTS PROGRAMS WAS ESTIMATED BY THE AMERICAN PUBLIC WORKS ASSOCIATION, IN 1980, AS 54 PERCENT OF CITIES AND 52 PERCENT OF COUNTIES IN THE UNITED STATES. THESE FIGURES ARE PROBABLY HIGHER NOW. AS TO STATES, THE URBAN INSTITUTE ESTIMATED THAT 21 OF 33 STATES THEY SURVEYED IN 1986 HAD CIPs.

NOT ALL OF THE PROGRAMS FOLLOW THE SAINT PAUL MODEL (NOR ARE WE SUGGESTING THAT THEY MUST) BUT THEIR PREVALENCE INDICATES A WILLINGNESS ON THE PART OF STATE AND LOCAL GOVERNMENTS AND OF CITIZENS TO BRING ABOUT A MORE RATIONAL AND EFFECTIVE APPROACH TO DECISION-MAKING ABOUT INFRASTRUCTURE IMPROVEMENTS. WE BELIEVE THAT THIS WILLINGNESS SHOULD BE ENCOURAGED AND SUPPORTED.

B. THIS IS THE SECOND OBJECTIVE OF MY TESTIMONY: TO RECOMMEND THAT THE FEDERAL GOVERNMENT ENCOURAGE BETTER DECISION-MAKING BY CITIZENS AND GOVERNMENTS ON INFRASTRUCTURE PLANNING AND PROGRAMMING. THIS CAN BE ACCOMPLISHED BY FEDERAL FUNDING ASSISTANCE (IF THIS IS A DIRECTION THAT

CONGRESS WILL TAKE) TO STATE AND LOCAL GOVERNMENTS IN INITIATING OR IMPROVING THE CIP PROCESS. ALSO, SHOULD THE CONGRESS DECIDE TO PROVIDE FUNDING ASSISTANCE FOR INFRASTRUCTURE PROJECTS, WE BELIEVE THAT THERE SHOULD BE A REQUIREMENT THAT ASSISTED PROJECTS BE A PART OF LOCALLY ADOPTED CIPs.

IN THIS WAY, GREATER ASSURANCE CAN BE GIVEN THAT PRECIOUS DOLLARS ARE USED WISELY -- EFFICIENTLY AND EFFECTIVELY. ALSO, CITIZENS CAN VIEW WHATEVER FEDERAL INFRASTRUCTURE FUNDING ASSISTANCE THE CONGRESS MAY PROVIDE AS A PRUDENT AND NECESSARY EXPENDITURE OF FEDERAL DOLLARS.

C. FINALLY, MR. CHAIRMAN, I WOULD LIKE TO MAKE TWO OBSERVATIONS IN REGARD TO HOW OUR RECOMMENDATIONS RELATE TO THOSE OF THE NATIONAL COUNCIL ON PUBLIC WORKS IMPROVEMENTS AS REPORTED TO DATE.

FIRST, THE COUNCIL HAS LOOKED AT INNOVATIONS THAT STATE AND LOCAL GOVERNMENTS HAVE SUCCESSFULLY IMPLEMENTED TO DEAL WITH INFRASTRUCTURE FUNDING PROBLEMS. IT IS LIKELY TO RECOMMEND THE USE OF A WIDE RANGE OF FUNDING MECHANISMS SUCH AS REVOLVING LOAN PROGRAMS, SPECIAL TAXES, OR USER FEES. AS STATE AND LOCAL GOVERNMENTS EXPAND THEIR FUNDING MECHANISMS, THE NEED FOR CAPITAL IMPROVEMENTS PROGRAMMING BECOMES EVEN MORE PRESSING. NEW AS WELL AS TRADITIONAL METHODS OF INFRASTRUCTURE FINANCING MUST BE COORDINATED

AND TARGETED, IF THEY ARE TO BE EFFECTIVE AND NOT WASTEFUL. THIS IS WHAT WE HAVE FOUND IN SAINT PAUL.

SECOND, THE COUNCIL IS LIKELY TO RECOMMEND THAT CONGRESS ENCOURAGE IMPROVED LOCAL MANAGEMENT OF PUBLIC WORKS. STATE AND LOCAL CAPITAL IMPROVEMENTS PROGRAMS SHOULD FIGURE PROMINENTLY IN ANY ACTION TAKEN BY THE CONGRESS TO ENCOURAGE IMPROVED LOCAL PUBLIC WORKS MANAGEMENT.

IN THE FINAL ANALYSIS, THE SOLUTION TO THE INFRASTRUCTURE CRISIS MUST INVOLVE PLANNING. STATES AND LOCAL GOVERNMENTS MUST JUDGE WHICH FACILITIES ARE MOST CRITICAL TO THEIR GOALS; WHEN THEY SHOULD REPAIR OR REHABILITATE AS OPPOSED TO REPLACE; AND WHAT LEVEL OF SERVICES OR QUALITY OF FACILITIES TRULY REFLECTS CITIZENS WANTS.

WHETHER A PROCESS BY WHICH THESE DECISIONS ARE MADE IS DIRECTED FROM A PLANNING OFFICE, A BUDGET OFFICE, OR BY THE MAYOR, THE CITY MANAGER, THE COUNTY EXECUTIVE, OR THE GOVERNOR, IT IS STILL A PLANNING PROCESS.

THANK YOU FOR THE OPPORTUNITY TO EXPRESS THE VIEWS OF THE AMERICAN PLANNING ASSOCIATION. WE WOULD BE DELIGHTED TO ASSIST THE SUBCOMMITTEE IN THIS IMPORTANT MATTER AND TO RESPOND TO YOUR QUESTIONS.

CHUCK CLARKE
Director

STATE OF WASHINGTON
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UNITED STATES SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
SUBCOMMITTEE ON WATER RESOURCES, TRANSPORTATION, & INFRASTRUCTURE
NOVEMBER 4, 1987

TESTIMONY OF PETE A. BUTKUS
WASHINGTON STATE DEPARTMENT OF COMMUNITY DEVELOPMENT
OLYMPIA, WASHINGTON

GREETINGS FROM GOVERNOR GARDNER

MY PURPOSE IN BEING HERE TODAY IS TWO-FOLD, TO DESCRIBE THE PUBLIC WORKS TRUST FUND (PWTF); AND TO HIGHLIGHT FOUR BASIC PRINCIPLES WHICH HAVE MADE THE PROGRAM A SUCCESS.

THOUGHTS ON NATIONAL/STATE/LOCAL INFRASTRUCTURE

CARL SANDBERG HAD SOME TOUCHING THOUGHTS ABOUT INFRASTRUCTURE, HE WROTE:
"I WILL DIE AS MANY TIMES
AS YOU LET ME GET OLD, SAYS THE CITY.
PUT THE CITY UP. TEAR THE CITY DOWN.
EVERY DAY THE PEOPLE SLEEP AND THE CITY DIES;
EVERY DAY THE PEOPLE SHAKE LOOSE, AWAKE AND
BUILD THE CITY AGAIN.
THE CITY IS A TOOL CHEST OPENED EVERY DAY.
THE CITY IS MADE, FORGOTTEN AND MADE AGAIN.
TRUCKS HAULING IT AWAY, HAUL IT BACK.

THE SANDBERG DESCRIPTION OF INFRASTRUCTURE DECLINE AND REBUILD IS AS VALID TODAY AS IT WAS THEN. IF THE PEOPLE—THE COMMUNITY—SLEEP, THE COMMUNITY WILL DIE AND NOT RECOVER.

IT DOESN'T MATTER IF A COMMUNITY IS IN DECLINE, STABLE OR EXPERIENCING RAPID GROWTH. GOOD PUBLIC WORKS ARE IMPORTANT TO MAINTAINING A COMMUNITY AND ARRESTING DECLINE AS WELL AS ENCOURAGING POSITIVE GROWTH. GOOD PUBLIC WORKS ARE AS IMPORTANT FOR AN INDUSTRIAL-BASED COMMUNITY AS FOR ONE WHOSE ECONOMY IS BASED UPON INFORMATION TECHNOLOGY. IN FACT, GOOD PUBLIC WORKS BECOMES THE SINGLE MOST IMPORTANT THING LOCAL GOVERNMENTS CAN PROVIDE IN THIS NATION'S EFFORT TO MAINTAIN AND EXPAND FOREIGN TRADE COMPETITIVENESS. (POLITICAL STABILITY/STABILITY OF THE DOLLAR)

AREAS THAT I WILL COVER

1. PWTF: WHAT IT IS
2. HISTORY OF THE PWTF
3. PHILOSOPHY OF THE PROGRAM
4. LOAN ACTIVITY TO DATE
5. FUTURE OF THE PWTF
6. THE REAL SUCCESSES OF THE PWTF
7. PERSONAL THOUGHTS

PUBLIC WORKS TRUST FUND: WHAT IT IS

THE TRUST FUND IS A UNIQUE, STATE-MANAGED, LOW-INTEREST REVOLVING LOAN FUND TO ASSIST LOCAL GOVERNMENTS IN FINANCING CERTAIN PUBLIC WORKS NEEDS.

THE UNIQUENESS OF THE PROGRAM LIES IN THREE ELEMENTS THAT DIFFER FROM THE HISTORICAL RESPONSE TO LOCAL GOVERNMENT PUBLIC WORKS CONCERNS. THOSE UNIQUE ELEMENTS ARE:

1. THE PWTF IS CAPITALIZED ON A PAY-AS-YOU-GO BASIS RATHER THAN THE SALE OF BONDS WITH REPAYMENT FROM FUTURE REVENUES.

2. FINANCIAL ASSISTANCE PROVIDED TO LOCAL GOVERNMENTS IS IN THE FORM OF LOANS RATHER THAN GRANTS.

3. WHEN EVALUATING LOAN APPLICATIONS, THE LOCAL GOVERNMENT'S "EFFORT" TO MAINTAIN ITS PUBLIC WORKS SYSTEMS IS CONSIDERED ALONG WITH "NEED" FOR THE PROJECT, RATHER THAN EVALUATION BASED SOLELY UPON "NEED."

EFFORT IS DEFINED AS:
- A. COMPREHENSIVE CAPITAL PLANNING,
- B. SYSTEM MAINTENANCE,
- C. WILLINGNESS TO OBTAIN REVENUE OR RESOURCES RELATIVE TO CAPACITY, &
- D. MANAGEMENT OF RESOURCES.

THE FUND IS CAPITALIZED WITH THE PROCEEDS OF FOUR DEDICATED TAXES:

UTILITY TAXES ON WATER AND SEWER UTILITIES
SALES TAXES ON SOLID WASTE COLLECTORS
A PORTION OF THE STATE REAL ESTATE CONVEYANCE TAX

PROCEEDS ARE CURRENTLY ABOUT $25 MILLION ANNUALLY

THE LOAN PROGRAM IS GUIDED BY THE STATE PUBLIC WORKS BOARD, A THIRTEEN-MEMBER POLICY BOARD, WITH MEMBERS APPOINTED BY THE GOVERNOR. BOARD MEMBERSHIP INCLUDES:

THREE FROM A LIST SUBMITTED BY THE WA ASSOCIATION OF COUNTIES-2 ELECTED, 1 PUBLIC WORKS MANAGER;

THREE FROM A LIST SUBMITTED BY THE ASSOCIATION OF WA CITIES-2 ELECTED, 1 PUBLIC WORKS MANAGER;

THREE FROM A LIST SUBMITTED BY SPECIAL PURPOSE DISTRICTS (WATER/SEWER/PUD); AND

FOUR GENERAL PUBLIC MEMBERS.

ROBERT C. ANDERSON, FORMER MAYOR OF EVERETT AND FORMER DIRECTOR OF THE STATE DEPARTMENT OF TRADE AND ECONOMIC DEVELOPMENT, NOW EXECUTIVE DIRECTOR OF THE WASHINGTON BANKERS ASSOCIATION, IS THE CHAIR.

MANAGEMENT SERVICES FOR THE PUBLIC WORKS BOARD ARE PROVIDED BY THE PUBLIC WORKS DIVISION OF THE DEPARTMENT OF COMMUNITY DEVELOPMENT. AS INTRODUCED, I AM THE DIVISION MANAGER.

THE FUND HAS STATUTORY AUTHORIZATION TO PROVIDE LOW-INTEREST LOANS, FINANCING GUARANTEES AND TECHNICAL ASSISTANCE TO LOCAL JURISDICTIONS. CURRENTLY, THE FUND IS MAKING LOANS AND PROVIDING LIMITED TECHNICAL ASSISTANCE. THE TECHNICAL ASSISTANCE ROLE IS EXPANDING TO ASSIST POTENTIAL APPLICANTS AND TO HELP LOCAL GOVERNMENTS INITIATE OR IMPROVE THEIR CAPITAL PLANNING.

THE FUND FINANCES THE REPAIR, RECONSTRUCTION, REPLACEMENT, REHABILITATION OR IMPROVEMENTS TO MEET CURRENT STANDARDS AND TO ADEQUATELY SERVE THE NEEDS OF THE EXISTING POPULATION. THE SPECIFIC FACILITIES OR SYSTEMS FUNDED ARE: BRIDGE, ROAD AND STREET, WATER, SANITARY SEWER AND STORM SEWER. NEW CONSTRUCTION OR GROWTH, SUCH AS BUILDING A BRIDGE WHERE THERE IS NOT A STRUCTURE CURRENTLY IN PLACE, IS SPECIFICALLY EXCLUDED AT THIS TIME.

THE ENABLING LEGISLATION REQUIRES THAT THE PUBLIC WORKS BOARD SUBMIT A PRIORITIZED LIST OF PROJECTS RECOMMENDED FOR LOANS TO THE LEGISLATURE, WHICH THEN APPROPRIATES THE FUNDS ON A PROJECT-SPECIFIC BASIS FROM THE DEDICATED ACCOUNT. THE LEGISLATURE MAY DELETE PROJECTS FROM THE LIST BUT NOT, BUT NOT, ADD NEW PROJECTS TO IT.

HISTORY OF THE PWTF: HOW THE FUND CAME ABOUT

IN 1982 THE JOINT ECONOMIC COMMITTEE OF THE U.S. CONGRESS COMMISSIONED A MULTI-STATE PUBLIC WORKS ASSESSMENT AND PUBLISHED A REPORT, HARD CHOICES, WHICH INDICATED AN INCREASING GAP BETWEEN AMERICA'S INFRASTRUCTURE NEEDS AND OUR ABILITY TO PAY FOR THEM.

DURING THE EARLY PART OF THE 1983 LEGISLATIVE SESSION, SENATORS MCDERMOTT AND GUESS (ONE DEMOCRAT, ONE REPUBLICAN; ONE FROM WESTERN WA, ONE FROM EASTERN WA) INTRODUCED LEGISLATION TO PROVIDE FOR A $750 MILLION BOND ISSUE FOR THE PURPOSE OF REBUILDING LOCAL GOVERNMENT PUBLIC WORKS. THIS LEGISLATION WAS THE CATALYST WHICH ENCOURAGED THE ASKING OF HARD QUESTIONS. QUESTIONS LIKE:

WHAT REALLY WAS THE MAGNITUDE OF THE INFRASTRUCTURE PROBLEM IN WASHINGTON?
WHAT WAS THE STATE'S ROLE IN PROVIDING FOR INFRASTRUCTURE NEEDS OF LOCAL GOVERNMENTS?
COULD THE STATE AFFORD, IN LIGHT OF BEING CLOSE TO ITS DEBT CAPACITY, TO PROVIDE A MAJOR INFLUX OF FUNDS?
WAS A BOND ISSUE THE BEST WAY FOR THE STATE TO PROVIDE THE MASSIVE FINANCING THOUGHT TO BE NEEDED?

THESE QUESTIONS AND OTHERS LED TO THE PASSAGE OF LEGISLATION WHICH AUTHORIZED A COMPREHENSIVE INVENTORY OF CRITICAL, LOCAL PUBLIC WORKS NEEDS IN 1983. THE RESULTS OF THAT NEEDS ASSESSMENT AND INVENTORY, PUBLISHED IN DECEMBER OF 1983

AS THE WASHINGTON STATE PUBLIC WORKS REPORT, REVEALED THE MAGNITUDE OF THE PUBLIC WORKS REPAIR AND REPLACEMENT PROBLEM IN THE STATE.

LOCAL JURISDICTIONS REPORTED A TOTAL OF $4.2 BILLION IN CRITICAL PUBLIC WORKS NEEDS IN THE 1984-88 PERIOD, AND IDENTIFIED $2.2 BILLION IN RESOURCES TO MEET THOSE NEEDS, LEAVING A SHORTFALL OF $2 BILLION. THESE FIGURES PROVIDED A BASIS UPON WHICH TO CONTINUE DISCUSSION OF FINANCING ALTERNATIVES.

IT IS IMPORTANT TO NOTE THAT OVER 40% OF ALL JURISDICTIONS REPORTED THAT THEY COULD MEET ALL OF THEIR CRITICAL REPAIR AND REPLACEMENT NEEDS WITH NO ADDITIONAL RESOURCES. OF THAT 40%, NEARLY THREE-QUARTERS OF THOSE JURISDICTIONS CAN BE CLASSIFIED AS SPECIAL PURPOSE DISTRICTS; WATER, SEWER, IRRIGATION, ETC.

FOR COUNTIES, NEARLY 80% OF THE AGGREGATE SHORTFALL IS IN ROAD PROJECTS. FOR CITIES, JUST LESS THAN HALF IS IN STREETS WITH THE REMAINDER SPREAD FAIRLY EVENLY AMONG BRIDGE, WATER, SANITARY SEWER AND STORM SEWER PROJECTS.

THE 1984 LEGISLATURE ESTABLISHED THE FRAMEWORK FOR WHAT BECAME THE PUBLIC WORKS TRUST FUND AND REQUESTED THE DEVELOPMENT OF A PLAN FOR FINANCING OF IDENTIFIED PUBLIC WORKS NEEDS. THE DEPARTMENT OF COMMUNITY DEVELOPMENT, IN DECEMBER 1984, PUBLISHED THE REPORT: FINANCING PUBLIC WORKS: STRATEGIES FOR INCREASING LOCAL INVESTMENT.

THE REPORT RECOMMENDED THE CREATION OF A REVOLVING LOW-INTEREST LOAN FUND TO PAY FOR PUBLIC WORKS REPAIR, RECONSTRUCTION, REPLACEMENT AND REHABILITATION. THE FUND WAS TO BE CAPITALIZED ON A PAY-AS-YOU-GO BASIS RATHER THAN THE SALE OF BONDS WITH FUTURE REPAYMENT. SEVERAL MEASURES TO INCREASE THE FLEXIBILITY OF LOCAL GOVERNMENTS TO RAISE AND INVEST TAX DOLLARS WERE ALSO INCLUDED AS PART OF THE RECOMMENDATIONS.

THE 1985 LEGISLATURE MODIFIED THE ORIGINAL (1984) TRUST FUND LEGISLATION, ESTABLISHED THE DEDICATED TAXES TO CAPITALIZE THE FUND, CREATED THE PUBLIC

WORKS BOARD AND DIRECTED THAT THE DEPARTMENT OF COMMUNITY DEVELOPMENT WOULD PROVIDE THE NECESSARY MANAGEMENT SUPPORT TO THE BOARD.

PHILOSOPHY OF THE PROGRAM

THE TRUST FUND STRATEGY WAS BUILT "FROM THE GROUND UP" AND HAS BEEN DRIVEN BY LOCAL PERCEPTIONS OF PUBLIC WORKS NEEDS AND REQUIRED ASSISTANCE.

IT WAS, AND IS STILL, AN EFFORT TO DEVELOP A POLICY TO RESPOND TO CONSTRICTED FEDERAL AND STATE FINANCIAL CONDITIONS. THEREFORE, THE STATE HAS MADE NO ATTEMPT TO TAKE THE PLACE OF LOCAL FINANCING RESPONSIBILITY, BUT RATHER HAS MADE A COMMITMENT TO ENHANCE LOCAL MANAGEMENT AND FINANCING CAPACITY TO MEET LOCAL NEEDS.

THE STATE BEGAN BY ASSESSING LOCAL PUBLIC WORKS NEEDS AND DESIGNING RESPONSES TO MEET THOSE NEEDS, RATHER THAN THE TRADITIONAL RESPONSE OF DEVELOPING AN ANSWER BEFORE HAVING A CLEAR PICTURE OF THE PROBLEM IT IS INTENDED TO SOLVE. THE VALIDITY OF SUCH AN ASSESSMENT WENT A LONG WAY TOWARD BUILDING SUPPORT FOR LATER-PROPOSED FINANCING PROGRAMS.

THE DEVELOPMENT OF THE TRUST FUND WAS GUIDED BY AN ADVISORY BOARD WHICH INCLUDED INDIVIDUALS REPRESENTING A WIDE RANGE OF INTERESTS WHICH INCLUDED COUNTIES, CITIES, SPECIAL PURPOSE DISTRICTS, THE FINANCIAL COMMUNITY, CONTRACTORS, LABOR AND ENGINEERING/ARCHITECTURAL INTERESTS. THIS MIX HELPED ENSURE THAT INTERESTS IMPACTED BY THE PROGRAM WERE INSTRUMENTAL IN ITS DESIGN.

PROGRAM DEVELOPMENT WAS GUIDED BY THE PHILOSOPHY THAT THE SOLUTIONS WHICH ARE MOST EFFECTIVE IN SOLVING LOCAL PUBLIC WORKS PROBLEMS ARE THOSE WHICH IMPROVE THE ABILITY OF LOCAL GOVERNMENTS TO FINANCE IMPROVEMENTS ON THEIR OWN. NO FINANCING PROGRAM THAT THE STATE COULD CREATE WOULD HAVE AS MUCH IMPACT AS

INCREASING THE LOCAL REVENUE BASE OR IMPROVING LOCAL MANAGEMENT AND PLANNING CAPACITY.

IT WAS AND IS IMPORTANT AS THE FEDERAL GOVERNMENT CONTINUES ITS REDUCED FINANCING ROLE, AND WITH THE STATE EXPERIENCING PRESSURE ON A LIMITED REVENUE BASE, TO DEVELOP A NEW BASIS FOR A PARTNERSHIP BETWEEN VARIOUS LEVELS OF GOVERNMENT AND THE PUBLIC AND PRIVATE SECTORS.

THE TRUST FUND WAS DEVELOPED TO MEET LOCAL NEED FOR DEPENDABLE FINANCING OVER THE LONG TERM. WHILE IT BEGINS AS A RELATIVELY SMALL PROGRAM IN RELATION TO THE PROBLEMS IT IS ATTEMPTING TO IMPACT, IT WILL CONTINUE TO GROW OVER TIME AND IS INTENDED TO BE A LONG-TERM FINANCING PARTNER WITH LOCAL GOVERNMENTS.

HIGH REAL INTEREST RATES AND MODERATE INFLATION MEANT THAT FINANCING A NEW STATE EFFORT THROUGH BOND ISSUANCE WAS LESS ADVANTAGEOUS THAN IN THE PAST. THE STATE HAD UTILIZED MUCH OF ITS BONDING CAPACITY WHILE MAJOR NEW INITIATIVES REQUIRING BOND FINANCING WERE BEING INTRODUCED. THIS LED TO RELIANCE ON DEDICATED FUNDING SOURCES TO FINANCE THE TRUST FUND. IT MEANT THAT THE PROGRAM WOULD BEGIN SMALL BUT GROW OVER TIME.

THE TRUST FUND IS DESIGNED TO BE RESPONSIVE TO LOCAL NEEDS AND TO BE NON-BUREAUCRATIC IN ITS OPERATIONS. THE GOAL IS TO MAINTAIN ADMINISTRATIVE FLEXIBILITY WHILE DEVELOPING A REPUTATION FOR FAIRNESS AND RESPONSIVENESS.

BEYOND FINANCING, A MAJOR GOAL OF THE TRUST FUND IS TO INCREASE LOCAL CAPITAL PLANNING CAPACITY. THERE ARE FEW ACTIONS COMMUNITIES CAN TAKE WHICH ARE AS IMPORTANT AS LOCAL CAPITAL PLANNING IN INCREASING THE EFFECTIVENESS OF LIMITED PUBLIC WORKS FUNDS. THE TRUST FUND HAS BEEN GIVEN THE AUTHORITY TO PROVIDE TECHNICAL ASSISTANCE FOR CAPITAL PLANNING, A PROGRAM WHICH IS EXPECTED TO BEGIN IN EARNEST BY EARLY 1988.

LOAN ACTIVITY TO DATE

FIRST CYCLE, 1986

LOAN REQUESTS TOTALED OVER $116 MILLION, CONSIDERABLY HIGHER THAN THE AVAILABLE FUNDS, WHICH WERE ESTIMATED AT $18 MILLION.

IN ORDER TO ENSURE THAT TRUST FUND MONIES WERE WIDELY DISTRIBUTED IN THE INITIAL CYCLE, THE PUBLIC WORKS BOARD ELECTED TO LIMIT LOANS TO A MAXIMUM OF $1 MILLION EACH AND STIPULATED THAT ONLY ONE LOAN WOULD BE GIVEN PER LOCAL GOVERNMENT. READINESS TO PROCEED WITH THE PROJECT WAS ALSO SET AS A CONDITION FOR PROJECT SELECTION.

EVALUATION OF THE PROJECT APPLICATIONS BY THE PUBLIC WORKS DIVISION STAFF AND BOARD RESULTED IN A PRIORITY LIST OF FORTY PROJECTS FOR A TOTAL OF $17.1 MILLION IN TRUST FUND LOANS.

THE 1986 LEGISLATURE APPROVED THE LIST AS SUBMITTED AND APPROPRIATED THE NECESSARY FUNDS.

LOANS FOR THE 1986 CYCLE WERE MADE AT A 3% INTEREST RATE WITH THE LOAN TERM SET FOR THE LIFE OF THE IMPROVEMENT OR 20 YEARS, WHICHEVER IS LESS. LOCAL GOVERNMENTS WERE REQUIRED TO PROVIDE A MINIMUM OF 10% OF THE PROJECT COST FROM OTHER SOURCES.

SECOND CYCLE, 1987

LOAN REQUESTS WERE FOR OVER $54.7 MILLION. INITIAL ESTIMATES WERE THAT BETWEEN $20 AND $22 MILLION WOULD BE AVAILABLE. DUE TO A CHANGE IN HOW CERTAIN REVENUES WERE COLLECTED, THAT ESTIMATE PROVED TO BE HIGH. THE ACTUAL AMOUNT AVAILABLE FOR LOANS TURNED OUT TO BE $17.5 MILLION.

THE LEGISLATURE APPROVED THE LIST AS SUBMITTED AND APPROPRIATED THE NECESSARY FUNDS.

THERE ARE SOME KEY CHANGES IN THE SECOND AND THIRD LOAN CYCLES OVER THE FIRST.

INTEREST RATES WILL VARY FROM 1 TO 3%. IN ORDER TO RECEIVE LOANS AT LESS THAN 3%, THE LOCAL GOVERNMENT MUST COMMIT MORE OF ITS OWN RESOURCES TO PROJECT FINANCING. (CARROT VS. THE STICK APPROACH)

LOCAL GOVERNMENTS WERE LIMITED TO THE SUBMITTAL OF ONE APPLICATION PER SYSTEM TYPE. ** (BRIDGE, ROAD/STREET, SANITARY SEWER, WATER, STORM SEWER)

REFINEMENT OF THE MEASUREMENT OF LOCAL RATE AND TAX INFORMATION TO ALLOW A BETTER UNDERSTANDING OF LOCAL EFFORT IN FINANCING PUBLIC WORKS IMPROVEMENTS.

GREATER EMPHASIS ON LOCAL MANAGEMENT PRACTICES IN MEASURING LOCAL EFFORT

THIRD CYCLE, 1988

LOAN REQUESTS TOTALED OVER $46 MILLION. $28.7 MILLION WAS AVAILABLE WHICH RESULTED IN 54 PROJECTS BEING RECOMMENDED FOR FUNDING. THE PUBLIC WORKS BOARD HAS EXPRESSED ITS DETERMINATION TO CONTINUE WITH THE 3-2-1 % LOANS AND TO INCREASE THE STRINGENCY OF THE COMPREHENSIVE CAPITAL PLANNING REQUIREMENT OVER TIME.

BEYOND 1988

BY 2000, THE TRUST FUND IS EXPECTED TO GROW TO AROUND $200 MILLION (AGGREGATE TOTAL) WITH ABOUT $50 MILLION AVAILABLE FOR LOANS EACH YEAR.

THE REAL SUCCESSES OF THE PUBLIC WORKS TRUST FUND

PROGRAM WAS BUILT FROM THE GROUND UP

PROCESS WAS KEPT SIMPLE

STRONG EMPHASIS ON LOCAL MANAGEMENT AND PLANNING—A STRONG COMMITMENT TO STOP REWARDING BAD MANAGEMENT!

PERIODIC REEXAMINATION OF POLICIES

PERSONAL THOUGHTS

LAST OF ALL, TO CLOSE THIS MONOLOGUE, AND SPEAKING FROM MY OLD CITY HALL PERSPECTIVE, I NEVER, NEVER, HAD ENOUGH RESOURCES TO DO WHAT I THOUGHT NEEDED TO BE DONE NOR TO DO WHAT THE PUBLIC WAS TELLING ME THEY WANTED DONE; SO, AT ONE POINT I DECIDED TO STOP COMPLAINING ABOUT THE LACK OF RESOURCES AND COMMITTED TO DO THE BEST JOB I COULD WITH WHAT I HAD.

I URGE YOU TO MOVE FORWARD, TO PROCEED, AND DO THE BEST WITH WHAT YOU HAVE! THANK YOU FOR INVITING ME TO JOIN YOU TODAY; I WILL BE PLEASED TO RESPOND TO ANY QUESTIONS THAT YOU MAY HAVE.

ATTACHMENT: THE NEED FOR DURABLE PRODUCTS IN OUR SOCIETY

THE NEED FOR DURABLE PRODUCTS IN OUR SOCIETY

Prepared by

Product Performance Center Advisory Group

May 8, 1987

Attachment to
Written Statement of
Pete A. Butkus

EXECUTIVE SUMMARY

For the last two centuries, higher levels of performance and productivity have been at the heart of American economic success. In recent years, however, the historical emphasis on high performance products in the United States has decreased. The United States now faces a growing need to increase the perceived quality, performance, and durability of its products.

There are many reasons for improving the performance of U.S. manufactured products. These benefits include: reduced repair and replacement costs, reduced energy and environmental quality costs, reduced use of valuable raw materials, improved utilization of manpower, and an improved international competitive position. Furthermore, recent studies have shown that relative perceived quality is the single most important factor in determining the long-term profitability of a company.

This paper presents information on the need for durable high performance products in the United States. An organization is suggested that would support increased product performance by improving technology utilization, economics, and policy. Early analyses identified two primary objectives for such an organization. One objective would be to improve the economy through increased sales of durable manufactured products. The other objective would be to improve the public infrastructure and reduce repair and replacement costs. Such improvements to the infrastructure provide indirect economic benefits and are essential to a sustained quality of life.

Because of immediate needs and the potential for very large identifiable returns, the objective to improve the infrastructure and reduce costs will be addressed in this paper. The other objective--to improve economic competitiveness--will follow in part as a natural consequence of improving the public infrastructure.

The primary evolution of the public infrastructure has occurred within less than 200 years. The benefits of this infrastructure of roads, streets, airports, water and waste systems, and buildings are clear--we are healthier, live longer, and travel more freely and safely than at any other time in recorded history. However, the resources needed to support this infrastructure are very large.

Facilities built with the latest materials and procedures are more efficient, reliable, and durable than older structures. For example, highways built today can handle greater loads and more traffic than roads built even 20 years ago. Similarly, new sewage treatment facilities handle greater volumes, accommodate more complex chemicals, and produce cleaner effluents than older plants. Despite this progress, there remains a substantial need to improve the performance of infrastructure components.

Examples of ways to apply new technology to increase performance and reduce costs include:

- reusing highway asphalt

- techniques to prevent corrosion
- life extension for bridge decks
- plastic waste pipe
- improving the strength of concrete
- expert systems
- heat pipes for deicing.

The identification of ways to measure performance and worth and to optimize the utilization of such new techniques is a basic social need.

One report estimated that maintaining and expanding U.S. highways, bridges, water, sewer, and other transportation systems would cost $1,157 billion between 1983 and 2000. Under present policies, only $714 billion would be available to meet these needs, a shortfall of 38%. In some states, anticipated resources were less than half of anticipated needs.

A recent study of the infrastructure in Washington State estimated that at least $22 billion must be spent by the year 2000 to meet emerging needs. This same study indicated that only about $12 billion would be available during the same period if existing policies are not changed. Thus, revenues are expected to account for about 56% of expected needs, slightly less than the comparable national figure of 62%.

A high-quality infrastructure is critical to continued growth and economic development. Possible approaches for meeting future infrastructure needs include:

- continued marginal response to needs
- increased funding
- more effective use of resources.

This paper suggests that the latter approach--more effective use of resources--is best. The elements of the approach include:

- Applying new and existing technology more effectively--Includes new materials, new testing methods, new construction methods, and improved methods of specifying requirements.
- Developing realistic life cycle costing approaches--Often, procurement is done on the basis of "low bid," which may not be the least costly method in the long term.
- Promoting new policies that support the use of optimum technology and economics.

THE NEED FOR DURABLE PRODUCTS IN OUR SOCIETY

INTRODUCTION

The United States now faces a growing need to increase the quality, performance, and durability of its products. For the last two centuries, higher levels of performance and productivity have been at the heart of American economic success. For example, in the last half of the 19th century, mechanical inventions and new agricultural techniques revolutionized farming. Today less than 3% of the total population produces enough food to feed the nation and leave a considerable surplus for export. During most of the 1900s, new materials, better production equipment, and improved design methods enabled U.S. industries to lead the world in productivity and in the introduction of new products. Even today, the most successful sections of the economy are those that emphasize high performance, reliability, and quality.

In recent years, however, the historical emphasis on high performance products has decreased. During the period from the end of World War II up to the 1970s, societal attitudes changed from the frugality born of the depression into "planned obsolescence" and "throw it away and buy a new one." This new attitude was incorporated into the design life calculations of engineers of that era.

Many U.S. manufactured products have acquired a reputation for being poorly constructed and unreliable. Many of the country's public works, including highways, bridges, and sewer systems, are in need of repair. Many large facilities, such as power plants, seem to have major operational problems. The United States is no longer considered the leader in the manufacture of many high performance products.

This paper presents information on the need for durable high performance products in the United States. For the purposes of this paper, high performance products are defined as **any product, material, or system that is more reliable or durable than current standards.** Thus, a high performance product could be a car that needs fewer repairs, a section of pavement that lasts longer, or an engine that operates more efficiently and reliably. The definition could even include design and construction methods that lead to higher performance products.

In this paper, an organization is suggested that would support increased product performance by improving technology utilization, economics, and policy. Early analyses identified two primary objectives for such an organization.

One objective of such an organization would be to improve the economy through increased sales of durable manufactured products. Foreign suppliers and some U.S. producers have demonstrated that durable products sell better than nondurable products. There are several reasons why increased product durability is evolving in world society. The most basic reason is that well-designed durable products cost less per unit of performance. While the initial cost is often greater for durable products, less frequent replacement over a given period may result in effectively lower costs.

The other objective of such an organization would be to improve the public infrastructure and reduce repair and replacement costs. Such improvements to the infrastructure would provide indirect economic benefits and are essential to a sustained quality of life. The nation's infrastructure presents a special opportunity for the use of high performance products. The problems of the current infrastructure are becoming increasingly well known: crumbling highways, collapsing water mains, overworked waste water treatment plants, and unmet needs in growing communities. Federal, state, and local governments must find hundreds of billions of extra dollars during the next two decades if these problems are to be addressed. If, however, ways to enhance the performance of the infrastructure could be systematically identified and implemented, less new revenue would be needed and the components of the infrastructure would be more reliable and last longer. A suitable low-cost infrastructure is an essential element of any economic development program,[1] but it can also have direct cost benefits. In the State of Washington alone, infrastructure cost requirements over the next 15 years will exceed $20 billion. If costs could be reduced by only 1% through the optimum utilization of technology, the resulting savings would be more than $200 million.

Because of immediate needs and the potential for very large identifiable returns, the objective to improve the infrastructure and reduce costs will be addressed in this paper. The other objective--to improve economic competitiveness--will follow in part as a natural consequence of improving the public infrastructure.

IMPROVING PRODUCT PERFORMANCE

Studies have shown that relative perceived quality is the single most important factor in determining long-term profitability of a company.[2] In many industries, U.S. products are perceived as being lower in quality than foreign products. The higher quality of foreign automobiles is often cited as an example. The U.S. balance of payments deficit is only partly due to dollar exchange rates. Many of the imports are being purchased because the United States, as a nation, thinks imports are better. In some cases, such as videorecorders, no U.S. manufacturer exists. While some U.S. industries are taking improved quality seriously (for example, Chrysler Corporation has recently instituted a 7-year--70,000 mile warranty), much remains to be done.

The reasons for a quality problem in the United States are too complex to cover here; however, the quality issue is cited because durability is one important part of perceived quality. When a product fails soon after purchase, long-term dissatisfaction sets in. Improved durability is one way foreign manufacturers penetrate the U.S. market. An example is the radial tire, which lasts longer than a bias-ply tire. In the short run, marketing a longer-mileage tire is self-defeating because it will cut unit replacement sales. Thus, U.S. manufacturers resisted retooling for radial tires until a significant portion of the U.S. market was controlled by foreign manufacturers. Similar examples can be cited in other industries.

There are many reasons why the United States needs to reemphasize its commitment to product performance. The following five reasons are especially important:

1. Repair and replacement costs. Products with limited durability require constant maintenance and repair. A poorly built highway, for example, must frequently be patched and sealed and must be replaced every few years. In contrast, a well-designed and carefully constructed road may require only minimal maintenance and can last decades under most conditions. Many of the nation's industries and government agencies have soaring maintenance and repair budgets as a consequence of the declining quality of products and facilities.

   Much of the nation's interstate highway system will reach its design life and will require replacement or major renovation in the next 15 years.[3] Thousands of bridges are in need of repair.[4] The national railroad system gets attention each time a defective track causes yet another accident. By the year 2010, fifty nuclear power plants will reach design life and will have to be decommissioned, unless ways can be found to extend their useful life.[5] Metallic corrosion of U.S. factories, cars, homes, and other products is estimated to cost $100 billion/year.[6] In the paper industry alone, paper costs are increased by $1 billion/year because of corrosion in manufacturing plants.[7] Many of these problems could be overcome by developing more durable products.

2. Energy and environmental quality costs. The production of poorly made products tends to increase long-term energy[8-12] use and environmental damage, especially since many such products are simply thrown away. For example, the production of a longer-lived automobile might initially require more energy than making a less durable car, but replacing the less durable vehicles would eventually increase overall energy consumption. Similarly, the environmental degradation caused by disposing of less reliable cars could be reduced if more durable vehicles were available. As the costs of controlling pollution mount, approaches to reduce environmental damage will be increasingly important.

3. Material costs. The production of durable products could lead to substantial savings of raw materials. Such products usually require only slightly more raw materials and can last much longer than less reliable versions. This results in reduced raw material needs in the long run. At a time when some critical materials are becoming scarce or are under the control of unfriendly or unstable countries, such materials conservation is valuable.

4. Manpower utilization. It is estimated that about 5% to 10% of the U.S. gross national product (GNP) is involved in repairing products.[13] Large numbers of people must be employed to repair and maintain poorly performing products. The nation's productivity and long-term growth

could be enhanced if many of these individuals could design and build new products for both domestic and export markets, rather than repair old ones.

5. International economic competition. High performance products would enable American producers to compete more effectively in foreign markets. Wage rates in the United States are higher than in most foreign nations. The difference can be partially offset if U.S. firms produce better products more efficiently. High performance products and production techniques are critical to maintaining U.S. competitiveness in the international market.

   A vice president[14] of a major bank who spent many years in the international field commented recently that he felt it did not make much difference what we did with respect to Japanese-U.S. trade barriers. The Japanese people were not likely to greatly increase their purchases of U.S. products because, in part, they did not feel U.S. products had enough quality. There is little question but that quality products are a necessary ingredient of survival in the world marketplace.

HISTORICAL PERSPECTIVE

The public infrastructure as it exists today began to evolve during the 1700s. Fortunately, this was the period when the soon-to-be United States began its evolution and revolution. The following is a brief history of the development of the public infrastructure.

Sewers and Wastewater Treatment[15]

In 1704, the City of Boston allowed a private citizen to construct a wastewater sewer (not for human wastes, however). All residents who connected to this sewer were obligated to pay for it. By the mid-1700s, Boston was one of the best-drained cities in the world.

In 1843, Hamburg, Germany, became the first city to build a comprehensive sewage system. This system served as a model for the Brooklyn (1857) and Chicago (1858) systems. Introduction of public water supply systems added to city wastewater problems. With more water came the development of indoor plumbing and bathtubs. The increased volume of wastewater prompted Boston to pass an ordinance in 1844 prohibiting the taking of baths without a doctor's order. The flush toilet was invented in 1809 but was used only minimally until the 1880s. The first separate sewer systems were designed in 1880 for Memphis, Tennessee, and Pullman, Illinois.

Early builders of sewer and drainage systems used commonly available materials such as clays, brick, and mortar. Wood stave pipe was also used up to large diameters (several feet in some cases). In 1885, concrete sewer mains were used for the first time in Washington, D.C. Current materials in use include clay, asbestos-cement, cast iron, steel, and plastic. In general, the new materials are stronger, weigh less, and are easier to install.

In the late 1800s, wastewater from most urban centers was disposed of in streams, rivers, lakes, or other water sources. About this time, treatment methods were under development that removed many organic pollutants prior to discharge. In 1889, the Massachusetts Institute of Technology established the first sanitary engineering curriculum.

Solid Wastes[15]

In the late 1700s, Benjamin Franklin did the city of Philadelphia (the population was about 60,000 at the time) a big favor. He ordered the dumping of all solid wastes into the Delaware River, thus creating the first systematic garbage collection and disposal service for a major U.S. city.

Water Supply[15]

Prior to the 1770s, American cities obtained water from nearby streams and wells; most of these quickly became contaminated and overextended. This situation resulted in the development of municipal water works. The first U.S. system was built in 1754 in Bethlehem, Pennsylvania, and consisted of water forced through bored hemlock logs into a wooden reservoir.

By 1818, Philadelphia replaced its leaky wooden water mains with iron pipes. This was the first extensive use of cast iron pipe in a U.S. city.

Seattle's first water system was built by Henry Yesler in 1854 and consisted of a small wooden tank and an elevated open V-shaped trough that moved water from a hillside spring to Yesler's lumber mill on Elliott Bay. By the 1870s, the open trough was replaced with small fir log pipes with 2-in. bores. In 1881, the Spring Hill Water Company was organized to provide the first water system for Seattle. It augmented its supply source of hillside springs with a pipeline from Lake Washington where a steam-powered pump was installed in 1886.

Following the fire of 1889, Seattle developed a municipal gravity-fed water system with the Cedar River the primary source. A 42-in.-diameter wood stave pipe delivered the first Cedar River water to the city. Portions of a 78-in. wood pipe (built later) are still in service.[16]

Street Lighting[15]

Apparently, the earliest known effort to "light" streets was in Rome about 200 A.D. where lamps were hung from each door. By 1684, London streets were lit (dimly at best) by candles in lanterns placed at every tenth house. Fifty years later (about 1736), 15,000 oil lamps were being used in London for street lighting.

The evolution of lighting in the United States included the use of gas lights in 1812 in Newport, Rhode Island. Whale oil was also used as a lighting fuel and whaling became extensive between 1830 and 1860.

The first electric street lights in the United States were used in Cleveland, Ohio, in 1877. In fact, the primary initial use of electric power was for municipal street lighting.

Airports[15]

The first airports were no more than grass fields because the first aircraft were light and needed only short distances to achieve flight. As aircraft increased in size and power, longer takeoff distances, durable pavement, and terminal buildings were required. These developments required larger land areas for airports. Today, air transportation is about 60 years old and now exceeds all other transportation modes except automobiles in terms of passenger miles traveled.

In the late 1920s, there were about 1,000 airports in the United States. By the 1970s there were 13,000 airports. There are now (1987) 14,500 airports, one-third of which are publicly owned. Of the airports existing today, only 5,500 have paved runways and only 69 have runways more than 10,000 feet long.

Roads, Streets, and Highways[17 18]

The Romans are credited with building the first extensive "paved" road network. In fact, it is estimated they built about 54,000 miles of roads within their empire (about equal to the length of the U.S. interstate system).

Between the time of the fall of the Roman Empire and the late 1700s, road construction and use mostly deteriorated. Fortunately, two individuals in England, John Macadam and Thomas Telford, both developed the concept of a relatively thin and smooth stone pavement structure at about the same time (early 1800s). The first "macadam" pavement constructed in the United States was built in Maryland in 1823. In 1906, the first bituminous macadam pavement was placed in Rhode Island. Tar was used as a "binder" and applied by hand with dippers.

The first portland cement concrete pavement was built in Inverness, Scotland in 1865. The first pavement of this type built in the United States was in Bellefontaine, Ohio, in 1891, but the section was only 10 feet wide and 220 feet long.

Information based on an 1870 survey in England reported that about one horse-related accident occurred for every 200 horse-miles traveled. In 1977, for U.S. freeways (urban and rural), about one accident occurred (total of all fatal, injury, and property damage accidents) for every one million vehicle miles traveled. This roughly translates to 5000 times fewer accidents within a span of about 100 years.

Summary

The evolution of the public infrastructure has occurred primarily within less than 200 years in the United States and in most other countries. The benefits of this infrastructure of roads, streets, airports, and water and waste systems are clear--we are healthier, live longer, and travel more freely and safely than at any other time in recorded history. However, the resources needed to support this infrastructure are very large.

CURRENT AND PAST SUCCESSES

There are numerous examples of improvements or potential improvements in infrastructure cost and performance. One of the fundamental problems in identifying and utilizing improvements was highlighted during the preparation of this report. There is a dearth of critical, objective analysis to identify optimum technology and potential savings.

Examples of technology that can be beneficially applied include:

- reusing the present asphalt surface in rejuvenating asphalt highways--A typical example is a ten-mile stretch of I-90 between Ellensburg and Vantage, Washington. There are some circumstances under which asphalt reuse may result in an improved highway at less cost. Potential savings can be up to 30%.[19] However, long-term performance data and realistic cost data must be developed before this technology can be optimally applied.
- new electrochemical techniques for reducing corrosion--Recently developed methodology for identifying the corrosion resistance of materials to various environments are helping to reduce corrosion in the pulp and paper industry. Potential dollar savings are in the hundreds of millions range.[20] These techniques can be applied to reduce corrosion in building materials, sewer lines, pumps, and other components. Potential savings are in the billions. There are presently relatively few efforts being made to identify potential future applications.
- bridge deck improvement--The replacement of bridge decks in Washington State and other systems costs hundreds of millions of dollars each year. Electrochemical anticorrosion techniques are available that can help prolong the life of bridge decks--with large potential savings.[21] The potential costs and savings, while substantial, are not well defined.
- plastic waste pipes in building construction--A simple example of the application of new materials is the use of plastic waste pipes in building construction. Properly used, these materials can provide longer life and improved performance at substantially lower cost.
- increased strength in portland cement concrete--The strength of portland cement concrete has increased by a factor of about seven over the last 70 years.[22-24] This increased strength has been achieved as a few step functions rather than as gradual increases. There are two needs indicated in this field: 1) the identification

of ways to continue the increases and 2) the identification of further uses and benefits of the increases.

- expert systems--Professors at the University of California and the University of Washington, as well as Washington State Department of Transportation personnel, are working on an artificial intelligence program that will apply the knowledge accumulated over many years to help solve problems for local road engineers.[25] [26] The program will query the user for basic information about the nature of defects, use, and environment. It will then recommend specific repair strategies.
- heat pipes for deicing--Heat pipe technology is being applied to use heat from the ground subsurface to maintain ice-free surfaces in roadway sections.[27]

Many of the above technologies--and others--are being increasingly utilized. A part of the job of engineering is to keep abreast of new technology. However, it is probable that assistance in sorting the wheat from the chaff will be very beneficial.

STATUS OF INFRASTRUCTURE

Facilities built with the latest materials and procedures are more efficient, reliable, and durable than older structures. For example, highways built today can handle greater loads and more traffic than roads built even 20 years ago. Similarly, new sewage treatment facilities handle larger volumes, accommodate more complex chemicals, and produce cleaner effluents than older plants. Despite this progress, there remains a substantial need to improve the performance of the infrastructure. The following sections describing the status of infrastructure in the United States and in Washington State illustrate this contention.

U.S. Infrastructure

The United States has the world's most elaborate network of infrastructure. The nation has hundreds of thousands of miles of paved highways, millions of miles of paved streets and roads, thousands of airports, and hundreds of transit systems. Thousands of cities, towns, and rural areas have water and sewage systems. In addition, communities have many other types of public infrastructure, ranging from domed stadiums in major cities to community centers in small towns. These facilities represent a combined public investment of over a trillion dollars. Over $50 billion is spent each year to expand and maintain highway facilities alone.

Despite such investments, there is overwhelming evidence that the quality of the nation's infrastructure is declining. Although examples abound, the following three illustrate the nature of the problem:

- The interstate highway system, the single largest integrated infrastructure project ever built, is literally falling apart in some places. The legislation creating the system mandated a 20-

year design life, and many sections of the system have passed that age without receiving significant repair or rehabilitation. The results of such treatment are shown by rough pavements, deteriorating bridges, and inadequate capacity.

- Water and sewer lines in many cities are not being repaired or replaced as needed. A study by the Port Authority of New York and New Jersey[28] noted that the city of Elizabeth, New Jersey, was replacing its sewer facilities using a 600-year cycle, rather than the 100-year cycle needed to properly maintain such lines. Similar problems in other cities have led to leaky pipes, sometimes resulting in the loss of over half of the water supplies before the pipes reach consumers.

- Mass transit systems in some cities resemble transportation museums. For example, age and deferred maintenance of New York subway cars have caused four times more breakdowns today than in 1971.[29]

In addition to these problems, the demand for new facilities is growing in many areas. Population shifts from the older cities of the Northeast and Midwest to burgeoning urban areas in the Sunbelt have generated needs for new highways, streets, transit systems, water supply systems, and sewage treatment facilities. Among the most obvious examples of systems being built to address these needs are the investment of billions of dollars to bring water to cities in Arizona, California, Nevada, and other western states and the construction of a new mass transit system for Los Angeles that will require hundreds of millions of dollars for its first phase.

Despite these growing needs for building new facilities and maintaining existing ones, there is relatively less funding available for infrastructure than in previous decades. A recent study for the Congressional Joint Economic Committee noted that total capital outlays for infrastructure in the United States have declined in real terms since the late 1970s.[30] Most of this decrease has stemmed from cutbacks at state and local levels. The federal infrastructure investment has remained at about 1% of GNP since the early 1960s, while state and local investments have decreased from 2.2% of GNP in 1961 to 1.9% in 1981.

The same study analyzed the gap between anticipated infrastructure needs and the resources available to address them. Using 1982 dollars, the report estimated that needs for maintaining and expanding highways, bridges, water, sewer, and other transportation systems would total $1,157 billion between 1983 and 2000. Under present policies, only $714 billion would be available to meet these needs, a shortfall of 38 percent. In some states, anticipated resources were less than half of anticipated needs. A breakdown of the needs and revenues by category of infrastructure is shown in Table 1.

Table 1. Infrastructure Needs and Resources, 1983-2000[31]
(billions of 1982 dollars)

Component	Needs	Resources	Shortfall
Highways and Bridges	720	455	265
Other Transportation	178	90	88
Water Systems	96	55	41
Sewer Systems	163	114	49
TOTAL	1,157	714	443

Washington State Infrastructure

The State of Washington infrastructure has many of the same problems that beset facilities in other states. Much of the state's existing infrastructure needs repair or replacement, while growing populations in some parts of the state impose demands for new facilities. Six of Washington's most important infrastructure problems are described below:

- Washington's portion of the interstate highway system needs considerable repair and rehabilitation. Some heavily used sections, such as the elevated highway through downtown Seattle, require very expensive rehabilitation efforts.
- The state's network of rural highways requires upgrading and maintenance. In recent years, many railroad routes in eastern Washington have been abandoned, which in turn has increased reliance on trucks for transporting agricultural commodities. This increased use has accelerated the deterioration of roads that are essential to rural economies.
- Population growth in the central Puget Sound region has overtaxed the area's highway and transit capacity. State and local governments are facing demands for new freeways, interchanges, streets, and mass transit systems.
- The state ferry system has extensive capital needs for new boats, piers, and terminals. The ferry system's operational problems have exacerbated many of these needs.
- Increasing concerns about pollution of Puget Sound and inland aquifers have generated new demands for sewer lines and treatment plants. Federal requirements for secondary sewage treatment will require substantial upgrading of existing facilities. The new cigarette tax will provide revenue to meet some of these needs, but concerns are already being expressed about the adequacy of such funds.

- o Solid waste disposal problems have made headlines for some time. A timely alternative to land fills is required.

A recent study of infrastructure needs in Washington estimated that at least $22 billion must be spent by the year 2000 to meet emerging needs.[32] This same study indicated that only about $12 billion would be available during the same period if existing policies are not changed. Thus, revenues are expected to account for about 56% of needs, slightly less than the overall national figure of 62%. Needs for different types of infrastructure are reported in Table 2; state highway and sewer projects account for over two-thirds of the shortfall.

Table 2. State Infrastructure Needs and Resources, 1983-2000[32]
(millions of 1983 dollars)

Component	Needs	Resources	Shortfall
State Highways	7,172	4,572	2,600
Ferry System	77	35	42
Country Roads	3,230	1,607	1,623
City Streets	2,760	1,614	1,146
Water Systems	1,872+	1,872	unknown
Sewer Systems	6,977	2,621	4,356
TOTAL	22,088	12,321	9,767

NOTE: No data on needs for water systems were available.

Buildings were not included in the data collected, but will be considered in developing a more durable infrastructure program.

OPTIONS FOR THE FUTURE

Infrastructure is critical to the nation's future growth and development. Highway systems allow people to commute to work or travel across the country and also facilitate prompt shipment of commodities. Transit systems offer the most practical means of traveling in large urban areas. Water and sewer systems ensure public health and protect the environment. High-quality infrastructure is one of the principal signs of an advanced economy. However, the infrastructure in the United States and in Washington State has not received enough attention in recent years. The existing infrastructure is relying on the investments of previous decades, and many of these investments are due to expire in the next few years.

There are three possible responses to current infrastructure problems. One response is to continue at present levels of investment. If this approach is pursued, the overall quality of life must eventually decline. Deteriorating highways will lead to longer commuting times, more congestion, more accidents, and higher shipping costs. Poor transit systems will mean more breakdowns, longer delays, less capacity, and poorer riding conditions. Antiquated water and sewer systems will threaten public health, increase damage to the environment, and require larger operating budgets to offset the losses from leaky pipes. Problems with any of these systems will hamper economic growth since it will be more difficult to supply utilities and raw materials to industrial facilities.

A second response is to increase funding levels. This approach will preserve the quality of the infrastructure and provide new facilities to meet emerging needs. The costs, however, will be high: probably an extra $440 billion in the United States and $10 billion in Washington State during the next 20 years.

A third response is to identify ways to use resources more effectively. New materials, new designs, new approaches, and new specifications could be used to build better systems at equal or lower costs. For example, a more durable paving material could extend the lifetime of roadways or save on repair costs. A new method for detecting structural problems in buildings or bridges could reduce the need to replace large sections of these structures. New coatings for pipes could increase lifetimes and thereby minimize replacement needs. These options, and many others, represent the substitution of thought for money.

New approaches to using resources seem to be of obvious value in meeting the large unmet infrastructure needs of the state and nation. These approaches will not eliminate the need to increase investments in infrastructure, but they could significantly reduce the amount of additional investment required. For example, it has been estimated that a 1% improvement in the average life of asphalt pavement could save $100 million annually within a few years.[3] Other payoffs of a similar magnitude are possible.

REQUIREMENTS FOR CHANGE

The previous sections of this report have discussed the desirability of durable products for (1) optimum internal economics; (2) energy/materials/environment conservation; (3) a competitive position in international trade; and (4) effective manpower utilization. The application of durable products to infrastructure problems presents a special opportunity to achieve prompt and significant benefits.

It is clear that the massive repair problems facing the United States in the next 15 years demand careful attention if the rate of further decay is not to exceed the rate of repairs. With budgets tight everywhere, today's repair problems should not be solved with the designs, materials, and methods used in the 1960s if there are better alternatives. While progress is being made, there is still a vast holdover of codes, specifications, materials, and methods from the "throwaway era." For example, some key questions about asphalt that were unanswered 70 years ago remain unanswered today.[3] The United States will spend $400 billion replacing and rehabilitating highway pavements by the end of the century, but an extensive highway research program is just getting started.

There are many possibilities for increasing the performance of infrastructure, but institutional barriers and lack of knowledge limit the use of these techniques. For example, many materials and testing approaches that could be applied to the infrastructure have been developed by the federal government's national laboratory system. At the present time, however, there is relatively little transfer of such knowledge to the agencies building and maintaining public works. Likewise, few state and local governments have access to independent sources of information about the performance of new materials or products. Thus, they tend to rely on traditional approaches rather than experiment with untried products. Such limitations hamper efforts to increase product performance.

The change to a durable products society involves technology change or utilization, economic change, and policy change.

Technology Change or Utilization

There are many technologies that could be used to increase product performance. Among the most obvious examples are:

- new materials--In many cases, new materials can be used that have longer lives, are less subject to corrosion or decay, and require less maintenance. These materials include polymers, ceramics, and composites.
- new testing systems--New measuring and evaluation techniques can be used to enhance quality control, identify repair needs, and ensure optimal performance.
- new construction and repair techniques--Many products can be improved if construction and repair activities are carried out more carefully. Similarly, reliability can be increased if problems can be identified early and if repairs can be targeted to specific locations.

Specifications need to identify weak links in designs that could cause failures of the whole. Examples are the corrosion of a bolt causing a bridge collapse or an improperly made concrete joint in a highway causing failure of the whole slab. While many new products to improve performance or lower costs have been proposed, it is difficult to separate the "hype" from the useful advancements. Thus, testing and certifying that products meet the new standards are essential.

There are other elements that have to be addressed. For example, if a product lasts for 20 years but a vastly improved model will be available in 5 years, what is the value of the original product during the last 15 years? Objectives should be changed so that the physical life of products and structures is the same as the technological life. Obviously, it is undesirable for things to last forever and preclude replacing them with more capable designs; however, it is also undesirable to keep fixing the same potholes the same way.

Economic Change

Most public infrastructure projects are awarded on the basis of lowest cost to meet the specifications. Unless the specifications require better life-cycle costs, rather than lowest first costs, things will be built that require replacement too soon. If standard methods were available for paying realistic life-cycle costs on a life-cycle basis, a much better job of optimizing product performance could be done. Working towards life-cycle cost payments is a desirable goal, but it is probably not completely achievable. However, as the long-range benefits of optimum life-cycle cost products are better understood, the costs to society can be reduced.

It is often cheaper to pay more for a product that is expected to have a long life or that requires less maintenance. This can be "felt" if the payment costs can be partly spread out over all or part of the product life. In a simplified example, using a 10% interest rate, the annual capital cost of a product that costs $500 and has a 5-year life would be $125 per year. If the product costs an extra $200 ($700 total) but has a 10-year life, the annual cost will be $112.50. In addition, maintenance costs will probably be greater with the cheaper product.

One method for achieving effective life-cycle costs is the sale of bonds with realistic life-cycle costing elements. This method is practiced to some extent today.

Policy Change

As used here, policy refers to laws, regulations, administrative practices and organizations. None of these practices necessarily support a high performance product economy at the present time. However, the extent to which they do support the concept, or the changes necessary to produce support, is not known.

The first step in achieving more nearly optimum policies is to provide an in-depth evaluation of present systems. This evaluation should include a review of systems that are in place with state and local governments and industry. After the information on current systems is collected, an analysis of the potential for applying new policies should then be done. From this analysis, the need for new rules or legislation will be defined. From the definition of needs, new laws and new organizational entities will be proposed.

A POSSIBLE APPROACH

A possible approach to improving the use of high performance products would be to form a new organization that would collect, evaluate, and disseminate information; work to remove regulatory barriers; and assist in technology transfer. The scope of the organization could be initially restricted to products affecting the infrastructure since this is an area of particular national interest with very large potential payoffs. In future years, the focus of the organization could be broadened to include other areas.

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APOGEE
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Statement of

Dr. Richard R. Mudge
Apogee Research Inc.

State and Local Innovations in Financing Infrastructure Services

Before the

ECONOMICS
FINANCE &
ENGINEERING

Subcommittee on Infrastructure
Senate Committee on
Environment and Public Works
United States Congress

November 4, 1987

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Mr. Chairman, I am pleased to appear before this committee to discuss new ways that state and local governments are using to provide infrastructure services. By way of background, I am a transportation economist with more than 15 years experience in the public and private sector and at the national and local levels of government. I am co-founder of Apogee Research, a Maryland-based firm that specializes in helping to solve economic, finance, and policy related problems of public works. Until last year, I was Chief of the Public Investment Unit at the Congressional Budget Office.

While much of my testimony today draws on work that Apogee has completed for the National Council on Public Works Improvement and for the National League of Cities[1], the contents reflect my personal opinion.

INTRODUCTION

Before discussing some of the newer financial techniques being used by many local governments, I will review recent trends in public works spending. These trends are important both because of their implications for the proper level of spending and for what they reveal about the financial pressures placed on state and local governments. I will close by mentioning some financial options available to the federal government.

But first, why do we care about infrastructure?

Public works projects establish the physical network upon which the country's economy depends. This network is not an end in itself. Rather, its importance to the economy and to society as a whole derives from the services it offers: the opportunity to improve productivity or reduce costs. Although most easily thought of in a physical form -- a bridge, a wastewater treatment plant, a subway train -- the real output of infrastructure is service: the movement of people and goods; the provision of adequate clean water.

Because of their long time horizon and high construction costs, major infrastructure investments usually involve higher risks than does the more typical industrial investment project. This means that some public sector involvement is often required.

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[1] For example, see National League of Cities, Financing Infrastructure: Innovations at the Local Level, forthcoming (December, 1987) and Apogee Research, A Consolidated Performance Report On the Nation's Public Works, (August, 1987), and Problems in Financing and Managing Smaller Public Works, (September 1987), prepared for the National Council on Public Works Improvement.

Infrastructure generates additional investment or economic activity through a multiplier effect on private firms or other public agencies. This occurs in several ways.

- By making better use of under-utilized resources that previously were very costly or difficult to obtain;
- By enabling more efficient tradeoffs among factors of production: reduced transport costs versus location closer to markets, for example;
- By increasing economic efficiency due to reduced costs; and
- By expanding markets as improved efficiency results in more effective competition with other countries or regions.

In sum, infrastructure encompasses those activities without which there would be only limited economic activity.

SPENDING TRENDS

The traditional measure of public works output has been the level of capital spending -- indeed many people measure success by the level of federal grants alone. While simple, this is misleading for two reasons. First, it encourages the view that public works are really pork barrel programs after all. Second, spending is important only to the extent that it reflects efficient investments. Projects such as the Tennessee-Tombigbee Waterway add little to our output of infrastructure services despite the billions of dollars spent on them.

The key to assessing the success of our infrastructure systems, however, is really the total level of services provided and the quality of these services. The nation's economy benefits from the vehicle miles travelled on our highways and the cargo and people they carry, rather than simply the level of spending. Of course, the quality of this service -- the odds of sitting in traffic for example -- must be counted as well.

Over the past 25 years, public spending on infrastructure has grown by more than 60 percent and now exceeds $100 billion a year. Most of this real growth occurred between 1960 and 1972, however, as federal and state governments worked to complete the Interstate Highway System.

The steady growth in overall spending, however, camouflages two contradictory trends. Public spending to maintain and operate the nation's infrastructure has grown in line with the economy as a whole and has increased almost twice as fast as the growth in population. Indeed, 1977 marks the first year that spending on operations exceeded public spending on capital (Figure 1). In sharp contrast, capital outlays by all levels of government have dropped from 2.3 percent of GNP in 1960 to 1.1 percent in 1984. This drop in capital spending relative to GNP generated much of the concern over the infrastructure crisis.

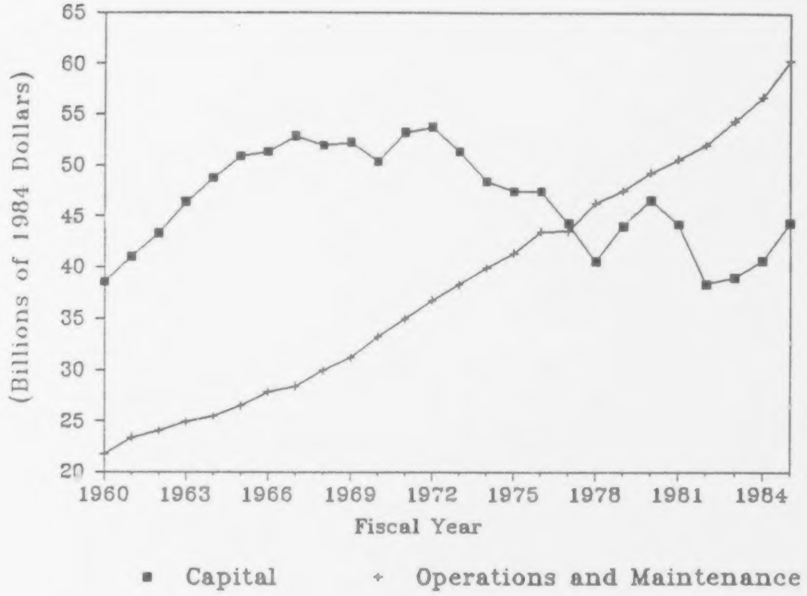

Figure 1. Total Government Spending for Public Works

Source: Apogee Research from Bureau of the Census and Budget of the United States Government, various years.

While public works outlays (capital plus operations and maintenance) kept pace with the nation's population growth (staying at about $400 per capita in 1984 dollars for the past twenty years (Figure 2)), spending has declined as a fraction of GNP, dropping from 3.6 percent of GNP in 1960 to 2.6 percent in 1984 (Figure 3). Infrastructure spending, whether in absolute terms or relative to population or GNP, only measures dollar inputs: it does not account for the output of public works -- the services provided.

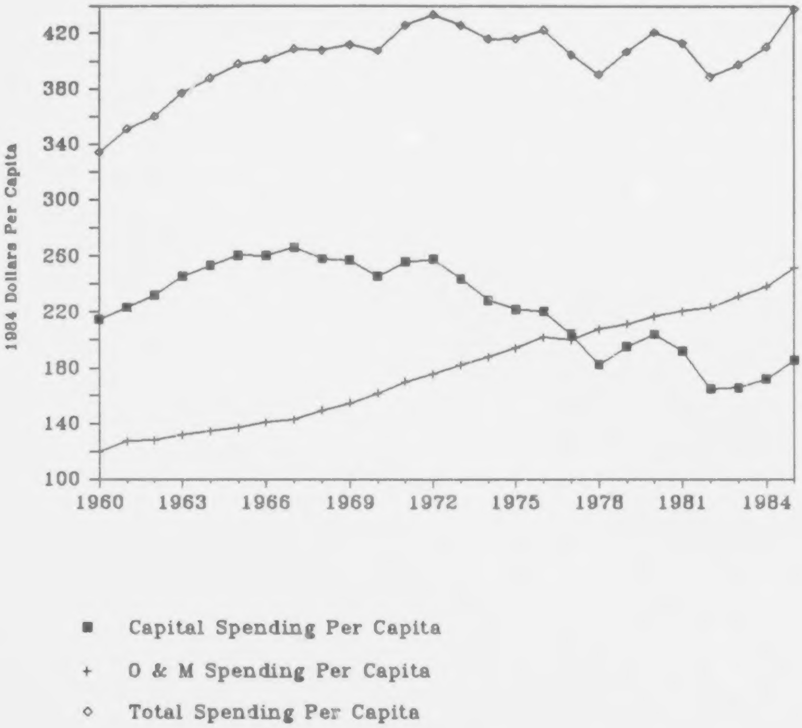

Figure 2. Public Works Spending per Capita

Source: Apogee Research from Bureau of the Census and Budget of the United States Government, various years.

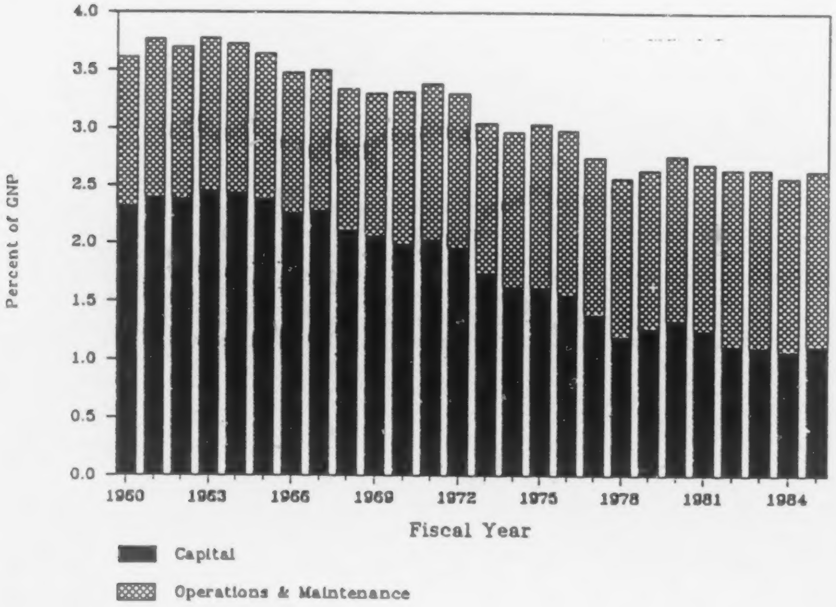

Figure 3. Public Works Spending as a Percent of GNP

Source: Apogee Research from Bureau of the Census and Budget of the United States Government, various years.

Spending By Level of Government

Just as spending on public works has declined relative to the economy as a whole, it also has declined as a share of government spending. the fraction of the federal budget devoted to infrastructure has dropped in half from more than 6 percent in the 1960s to under 3 percent in 1984. State and local governments as a whole devote 18 percent of their budgets to infrastructure now versus 25 percent in 1960. Most of this declined occurred in capital spending, with only a modest drop in the proportion of government budgets devoted to operating and maintaining public works.

Overall, federal capital spending has kept up with inflation, however, and has even grown somewhat, averaging about $75 per capita over the past 25 years. Overall, state spending has declined since 1970 and has remained below federal spending for the past decade. In sharp contrast, local spending has also shown a steady growth, particularly for O and M, reflecting the need to maintain the facilities built during the 60s and 70s (Figure 4).

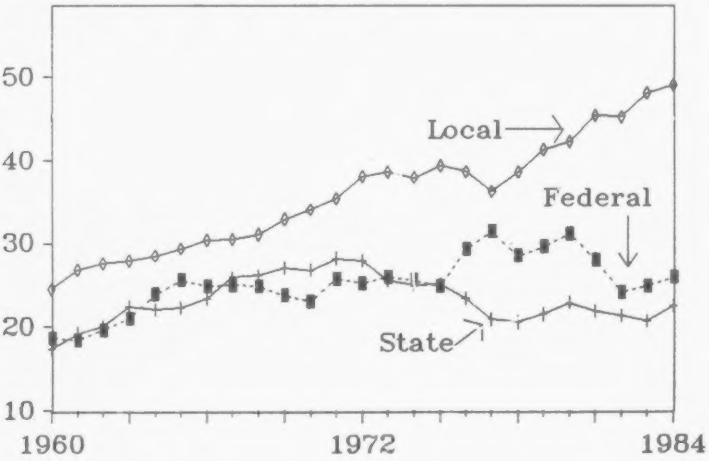

Figure 4. Total Public Works Outlays by All Levels of Government

Source: Apogee Research from Bureau of the Census and Budget of the United States Government, various years.

Between 1960-1975 federal grants accounted for about one-third of total state and local capital expenditures for public works (Figure 5). This percentage peaked at about 50 percent, largely due to sizable federal wastewater treatment and mass transit grants. Since 1977, federal grants have declined somewhat, ranging between 40 percent and 45 percent of total state and local public works capital expenditures.

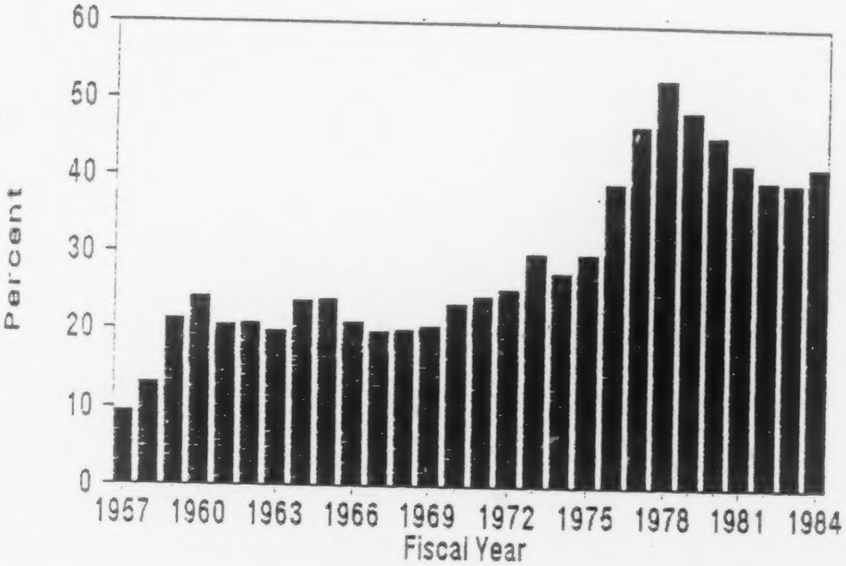

Figure 5. Federal Grants as a Percent of State and Local Spending

Source: Apogee Research from Bureau of the Census and Budget of the United States Government, various years.

Public Works Assets

Net public works capital assets have nearly doubled since 1960, approaching $1 trillion today. Between 1960 and 1975, for example, aggregate assets grew by 3.6 percent a year, enough to keep pace with the growth in GNP. For the past ten years, however, assets have grown by less than 1 percent a year (Figure 6). As a result, each dollar of public works assets now supports 4.1 dollars of GNP versus 3.4 dollars of GNP in the 1960s. For the most part, this change in growth has been driven by absolute declines in the two largest categories -- highways and water resources.

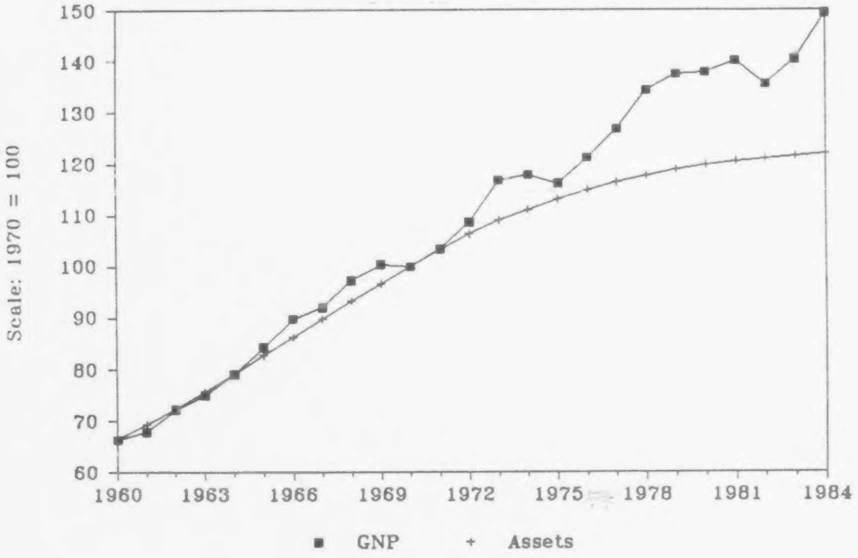

Figure 6. Comparison of GNP Versus Assets

Source: Apogee Research from Bureau of the Census and Budget of the United States Government, various years.

Summary of Spending Trends

Three simplified interpretations of these spending trends are possible:

- We have under-invested in public works;
- demand for public works has declined; or
- the productivity of our public works has improved.

In fact, each is probably true to some extent.

If productivity has improved, the question is not simply whether or not investment levels are adequate. Rather, has increased productivity been great enough to offset the past decline in spending and can we reasonably expect future productivity gains large enough to offset growing demand for public works services? While I believe that important gains in productivity are still possible, they will not be enough to offset the future demands for public works services.

Consequently, policy initiatives must focus not simply on how much to spend (as demanded by various needs surveys), but how to attain the level of capacity necessary to serve current and expected demand. The approach implies two strategies:

- Make more effective use of existing resources;
- Spend more to build new systems and rehabilitate worn ones.

As a result, continued pressure on local governments both to operate the bulk of the nations infrastructure, but given federal and state budget pressures, they will have to play a larger role in adding capacity.

LOCAL FINANCIAL INNOVATIONS

With the financial constraints imposed in recent years by reduced federal grants coupled with taxpayer revolts, local jurisdictions have been forced to generate new ideas to help finance infrastructure. Different approaches have been tried for a variety of public works investments and in a wide range of local environments.

The innovative financing techniques discussed here include:

- special financing districts;
- exactions;

- utilities; and
- public private participation.

Special Financing Districts

Special financing districts are created to fund specific projects within the district. District projects are financed either through extra fees collected in addition to regular jurisdiction-wide property, sales and incomes taxes (special assessment districts) or through the diversion or earmarking of taxes to a project fund (tax increment financing districts).

Missoula County, Montana provides an interesting example, partly because it is a rural, slow-growing county that does not meet the stereo-type for a source of innovative financing ideas. Since 1965, Missoula has been using Rural Special Improvement Districts (RSIDs) to finance a variety of infrastructure projects, including investments in sidewalks, roads, utility expansions, sewer plants, and water projects. In addition to RSIDs for capital investment, Missoula also uses perpetual maintenance RSIDs to support upkeep of improvements installed under the program.

Since 1965, almost 900 RSIDs have been created in Missoula County. The full value of individual projects partially or fully funded through RSIDs has ranged from $50,000 to over $1.6 million.

Exactions

Exactions may be generally defined as money, land, or construction services and materials provided to a public jurisdiction by a developer. A developer may offer exactions voluntarily to expedite project approval or completion. Or, exactions may be an "entry charge" required by local jurisdictions as a prerequisite for building. In this case, charges may be negotiated individually or assessed on a systematic basis according to an established formula legislated by local or state authorities. In the latter case, developers are required to pay impact fees or special taxes to compensate the local community for provision of off-site services and infrastructure in addition to any on-site infrastructure required by local building codes.

Traditional exactions include land dedications for rights of way, parks, and the like, and cash payments in lieu of land. Exactions have been expanded in recent years to include donations of specified facilities, construction of off-site infrastructure such as intersections and roads adjacent to the development, addition of low or moderate income housing units to the development project, and impact fees.

For example, Upper Merion Township, a suburb of Philadelphia, created a transportation development district (TDD) to ensure that new development helps pay for road improvements. The TDD allows the township to charge impact fees based on the number of trips generated by new development, with the revenues dedicated to transportation improvements anywhere within the town. The typical charge is almost $1,000 for each peak-hour auto trip that a new development is expected to create. Some developers have offered to provide the improvements directly themselves, arguing that they can complete the work more efficiently than the town.

Utilities

Utilities are a type of independent special assessment district created to oversee all aspects of a particular public works system including financing, construction, and operation and maintenance. They are autonomous public corporations answerable to local governments. Utilities may be distinguished from other independent special assessment districts by their greater duration, geographical breadth, and functional scope.

Utilities are not created for a limited duration such as the construction period but are assigned perpetual responsibility to operate and maintain the particular public works facility. In addition, utilities are not established for selective neighborhood components of a public works system; the whole generating and distribution structure is usually included. Finally, utilities handle all decisions concerning financing, personnel, and administration directly; these are not delegated to another governmental department.

An example of the use of utilities can be seen in Ft. Collins, Colorado. Fort Collins has four utilities: stormwater, water, sewer, and transportation. All four utilities are responsible for the operation, management, and maintenance of their respective systems. The water, sewer, and storm water utilities are also responsible for engineering and development of required capital improvements. These utilities are funded through fees charged to the users of the utilities. The charges for each utility are related to benefits, using a measure for benefits appropriate to each type of service.

Public-Private Participation

While most of the financial techniques mentioned here involve public-private cooperation, some rely on direct participation by one sector (public or private) in a venture controlled by the other sector. In these cases, funds or services are contributed in exchange for enjoyment of certain rights or future income.

Private participation in public works can be active or passive. Active participation includes direct private investment and administration of a basically public responsibility. For example, in Babylon, New York a private firm contributed part of the initial capital for a solid waste processing plant and administers the leased facility under the City's overview.

There are several types of passive private participation in public works. In the first, private developers or new entrants contribute funds in exchange for contractually defined rights to use the public works being constructed. The advantages of these arrangements, such as sale of sewer and water access rights, is the contribution to capital by those needing the incremental capacity and a corresponding shift in burden away from users already in the system. As with many other financial instruments, disadvantages include the possibility of altering development decisions. Houston Texas and Escondido California offer good examples of this approach.

While many of these techniques are most easily implemented in rapidly growing communities, they can -- and have -- been applied under virtually all conditions. Indeed, while state and local laws and regulations may restrict their use, imagination and political will are often more significant barriers.

SOME FEDERAL OPTIONS

There are a number of changes that the federal government could make to encourage state and local provision of infrastructure. I will discuss two of these: the use of trust fund cash balances to establish infrastructure revolving funds and the use of comprehensive performance monitoring.

Federal Trust Funds

The federal trust funds for highways, mass transit, airports and airways, and water resources have accumulated more than $20 billion in cash. These funds are completely financed by users through a series of excise taxes -- most importantly the nine cents per gallon tax on motor fuel, a series of truck taxes, and an eight percent tax on airline tickets. Sound operation of these funds requires cash reserves of only about $3 billion. Because each dollar reduction in trust fund cash increases the federal deficit, the pace with which these funds are used depends, in part, on the success that Congress and the President have in reducing the federal deficit.

One idea would be to use the cash as seed capital for state revolving loan funds dedicated to infrastructure. This would establish a series of permanent institutions that could serve as engines for future investment in public works. Just as the

Highway Trust Fund provided the momentum for much of the public works investment of the 1950s and 1960s, greatly increased spending for infrastructure is unlikely today without a strong set of financial mechanisms. Given the limits on a strong federal role, it is logical to place such institutions at the state or local level.

Performance-based Budgeting

Much attention is focused on the level of spending for public works, with little focus on how well the funds are being spent. Performance monitoring provides a systematic way of improving the effectiveness of public works investments by linking public policies, future expenditures, and financing techniques to the quality and quantity of services provided.

A performance analysis is different from many traditional approaches to assessing the adequacy of public works in that it considers the outputs of the systems themselves as opposed to either the dollar inputs or projections of demand. In essence, it seeks to answer the question: How well is the system in place providing the services for which it was intended? Such an analysis can consider many facets of performance including service output relative to assets, cost-effectiveness, quality of service, and external impacts, and it may be designed to augment either managerial or policy-level decision making processes.

Performance budgeting would be a powerful tool to help decision-makers allocate scarce resources in the most efficient way, as well as providing role models of the most successful projects. Incorporated into the budget process, it can provide a "report card" on past spending, which can then be used as base for future spending decisions. Used prospectively, it can project the outcomes of alternative spending scenarios.

Effective implementation of a performance monitoring system requires close cooperation among all levels of government. The federal government is probably a good source of seed money for the data collection and can serve as a coordinator. Reliable data collection, however, requires the direct involvement of local governments in the design of the performance measures. A key question is whether such an approach would function best on a mode by mode basis (as with UMTA's Section 15) or through a new, cross-modal agency.

Small Public Works

A special aspect of state and local infrastructure problems concerns that of small or low-density systems. Although public works facilities come in all sizes, public attention tends to focus on the largest facilities: the Interstate Highway System, international airports, subway systems, etc. This focus neglects the much more numerous small or low density systems. Nearly 100 million or 44 percent of the population live in small communities and "small" public works account for between 60 percent and 90 percent of all public works facilities.

These small systems are important for several reasons. Most obviously they provide the same vital infrastructure services that users of larger systems enjoy. They also are the primary means of access to the national transportation network: for example, most highway trips have either their origin or destination on a small systems road.

Small system public works face various financial problems. On average rural communities have lower per capita incomes than do more urbanized areas, reducing their ability to finance projects independently. Smaller facilities often have limited access to financial markets, both because fixed costs make up a higher percentage of any bonds issued and because small communities may be less well known and thus less readily accepted by the financial markets. Further, because of economies of scale, many smaller public works facilities have significantly higher costs. For example, it costs nearly four times as much to provide a gallon of clean drinking water in a community of 500 versus one of 500,000.

Options that address these problems include better technical, financial and managerial information and the continuance of targeted financial assistance. In some cases, these may require new institutions, perhaps a "Muni-Mae" to help small-issue debt or perhaps an Infrastructure Extension Service.

That concludes my prepared remarks, Mr. Chairman, I would be pleased to answer any questions the Committee might have.

NATIONAL
FARMERS
UNION

November 3, 3987

The Honorable Daniel P. Moynihan, Chairman
Subcommittee on Water Resources, Transportation
and Infrastructure
Committee on Environment and Public Works
United States Senate
464 Russell Senate Office Building
Washington, D.C. 20510-3202

Dear Mr. Chairman:

On behalf of the National Farmers Union, I would like to express to your Subcommittee some concerns we have relating to the deterioration of America's infrastructure, particularly in the rural areas of the country.

Nowhere has the impact of deterioration been more acute than in the transportation system in rural America. Literally, our roads and bridges are falling apart. Interstate highways are in serious need of repair. But in even greater disrepair are many of the secondary roads and bridges throughout rural America. With increased heavy truck traffic on many of these roads as a result of inadequate or non-existent rail service, many jurisdictions are finding it impossible to repair and maintain these roads and bridges in a condition that will allow traffic to proceed in an orderly and safe manner. A major part of the problem, as I will detail later, is a lack of local revenue to provide for the necessary maintenance and improvement of both state and local roads.

Also of concern is the deterioration of many of our dams and waterway systems. Not only does a lack of proper maintenance create a major danger to public safety it also impedes rural development and the transportation of agricultural input items and farm commodities. As a result of federal budget cuts over the past few years needed repairs and even routine maintenance of dams and reservoirs has been postponed or neglected. Equally serious has been the lack of proper maintenance and further development of our inland waterway system, resulting in both time-consuming and costly delays.

It is imperative that adequate funding be made available to upgrade and maintain America's internal transportation system. Not only is public safety at issue, so is the ability of America's farmers to move their commodities to market in an expeditious manner and at a reasonable cost. It is certainly in

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Sen. Moynihan pg.2

the national interest, given the importance of agriculture to the economy, that every effort be made to provide for reliable and efficient transportation of farm products to the market.

Of equal concern to residents of small towns throughout the country is the physical deterioration of many of their public building and service systems.

Local communities are finding it difficult to maintain schools and other public buildings, such as police stations, hospitals, etc., due to a drastic reduction in revenue resulting from the continuing economic crisis in the rural economy.

Rural communities rely, to a large degree, on property taxes to fund local services. With the decline in property values over the past six to eight years in farm land, residential and commercial property, the tax base of many local communities has been eroded to the point that they can no longer maintain the level of services expected by their citizens. In states where the economy is heavily dependent on agriculture, state governments are in no position to financially assist local governments in maintaining or upgrading local public services.

Adding to the financial burden of state and local government has been the elimination of federal revenue sharing. For many of these communities revenue sharing was a major factor whereby they could maintain and upgrade services. We strongly feel that the Congress should reinstate general revenue sharing as a first step in the rehabilitation of rural America.

I commend to the Subcommittee's attention a report issued in May, 1986, by then-Chairman David Durenberger of the Senate Subcommittee on Intergovernmental Affairs, entitled "GOVERNING THE HEARTLAND: Can Rural Communities Survive the Farm Crisis." The report sets forth, in detail, the impact that the economic crisis in rural America has had and will continue to have on the ability of rural communities to provide services to their citizens.

Mr. Chairman, the impact of the economic situation in rural communities to provide services and to repair, rehabilitate and maintain the transportation and service infrastructure will literally take years and a massive infusion of federal funds to correct.

If you have any doubt as to the inability of many of these local units of government to meet the needs of their citizens, we urge you to continue this series of hearings and to specifically hold one or two field hearings in rural areas of the country to allow the mayors, commissioners and supervisors to explain to you and show you first-hand the need for immediate federal assistance

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in rebuilding the infrastructure of rural America.

The National Farmers Union commends you for holding these hearings and focusing on the urgent need to rebuild and rehabilitate the infrastructure of our country.

Mr. Chairman, I respectfully request that this letter be made a part of the record of your Subcommittee hearing of November 4, 1987.

Sincerely,

Robert J Mullins

Robert J. Mullins
Legislative Assistant

encl.

cc: Members of the Subcommittee